

Aide-de-Camp's Library



Rashtrapati Bhavan
New Delhi

Accn. No. 35

Call No. I(a) - H

The New
UNIVERSAL
Encyclopedia



Volume 8



*Printed in Great Britain by
The Amalgamated Press, Ltd., London*



Specially painted for the New Universal by Stephen Bone

DURHAM UNIVERSITY since 1840 has had its headquarters in the castle, dating from Norman times, which, together with the cathedral, dominates the city from the hill peninsula overlooking the River Wear. The colleges there specialise in candidates for the Anglican ministry

The New UNIVERSAL Encyclopedia

Edited by

Sir John Hammerton

*Editor of The Universal History of the World,
The Second Great War, etc.*

VOLUME EIGHT

pages 6105 to 6968

NORM—RHET



London : The Educational Book Co., Ltd.

Normal School OR COLLEGE. Institution for the training of teachers for the work of education. The term, which is a translation of the French *école normale*, is more commonly used in the U.S.A. than in Great Britain, where the usual name for such institutions is training college. See Education: Training College.

Normal Temperature and Pressure. Conception in physics. Since the volume of a given mass of gas varies with the temperature and pressure, it is essential to define conditions of measurement when the density of the gas is quoted. It is usual to express this density as the value, termed normal density, which the gas would possess if the temperature and pressure were 0° C. and 76 cm. of mercury. These conditions are standard or normal temperature and pressure (S.T.P. or N.T.P.).

If V is the volume of gas measured at p cm. Hg pressure and t° C., then the volume V_0 occupied by the same mass of gas at N.T.P. is given by

$$\frac{pV}{273 + t} = \frac{76 \times V_0}{273}, \text{ or}$$

$$V_0 = \frac{pV}{76} \times \frac{273}{273 + t} \text{ c.c.,}$$

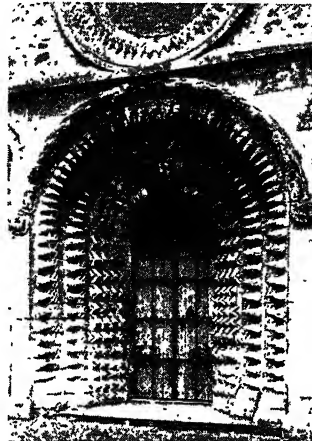
if V is expressed in c.c. Hence, to calculate the mass of a given volume of gas under particular conditions, it is necessary to reduce the volume to N.T.P. by the above formula, and then multiply by the density at N.T.P.

Norman. Name given to the people of Normandy and their descendants in countries which were conquered by them. The word Norman, Fr. *Normand*, is identical with Northman, but is generally restricted to the mixed race which arose after the conversion of the heathen settlers and their adoption of French culture. This race displayed extraordinary energy and love of adventure; military, legal, and organizing powers; and great adaptability. Itself the product of one of the latest of the great European migrations, it spread Latin order and discipline through many regions, posed as the champion of the papacy, and initiated the movement which culminated in the Crusades. The conquest of England was followed by the permeation of the Scottish Lowlands by Norman chivalry, while S. Wales and the Irish Pale were being conquered.

About 1017 Norman adventurers intervened in the struggles in S. Italy between Greeks and

Volume 8

Muslims, and by craft and force established a dominion under Robert Guiscard, who became duke of Apulia and Calabria in 1059. His nine brothers aided in the conquest, Roger I overthrowing the Arabs of Sicily, 1060-91. Roger II, crowned king of Sicily

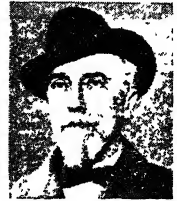


in 1130, united the Norman possessions on the mainland, including Naples, with his own, and conquered Corfu and Mahedia in N. Africa. William II conquered Epirus and sacked Salonica, 1185. The Norman dynasty died out in 1194, having established one of the best organized kingdoms in Europe.

Norman, MONTAGU COLLET NORMAN, BARON (1871-1950). British banker. Born in London, Sept. 6, 1871, he was educated at Eton and King's College, Cambridge, and served in the S. African War. A director of the Bank of England from 1917, he was made deputy governor

in 1918, and governor in 1920, holding the post until his retirement in 1944. He had a large

share in framing and guiding the financial policy of Great Britain; he advised a return to the gold standard in 1925, and after its abandonment in 1931



Lord Norman, British banker

followed a policy of controlled inflation. His actions aroused criticism, but he never ceased to enjoy the confidence of the government, whatever its party. In 1923 he was made a privy councillor and on retirement he was given a peerage. He died Feb. 4, 1950.

Norman Architecture. Name applied to a style of building in England and Normandy during the 11th and 12th centuries. It is said to have been introduced into England by Edward the Confessor, who built the choir and transepts of the old abbey of Westminster, but was not fully developed until after the Conquest. Historically, it is a local variety of Romanesque.

The main characteristics of Norman, as of Romanesque, architecture are the round arch and the plain round or rectangular column. Little is made of the base of a column; the bell capital (*q.v.*) is much the same as the Saxon in design and workmanship; vaults are of the barrel variety, roofs gen-



Norman Architecture. The rounded arches and columns in St. John's chapel in the Tower of London. Top, the West door of Iffley church, near Oxford, a fine example of a Norman rounded arch and mouldings

erally of wood, and masonry thick-jointed and rough. In the reigns of William I and William II the principal building was the castle.

In the 12th century the style grew more ornamental. Heavy barrel vaults were groined; the angles of rectangular piers softened by recessed columns; doorways became more highly decorated, and enrichment more general in the direction of mouldings. The employment of the square and hatched billet, chevron, scallop, and other typical Norman ornaments was extended. Buttresses, at first wide and of slight projection, became much bolder. One of the best examples of a 12th century church in London is S. Bartholomew's, Smithfield. See Arch; Architecture; Castle; Door; Romanesque; consult Norman Architecture, E. G. Browne, 1907.

Normanby. Place in the N. Riding of Yorkshire, England. It lies 4 m. S.E. of Middlesbrough, in the urban district of Eston. A different Normanby, also in the N. Riding, is the village 5 m. S.W. of Pickering, from which the family of Phipps takes its title (*v.i.*).

Normanby, MARQUESS OF. British title borne since 1838 by the family of Phipps. In 1767, Constantine Phipps (1722-75), a grandson of Sir Constantine Phipps (1656-1723), lord chancellor of Ireland, was created an Irish baron, and in 1790 his son, Constantine John, was made an English one. On his death in 1792 the Irish title of Baron Mulgrave passed to his brother Henry (1755-1831), who was foreign secretary 1805, and first lord of the admiralty 1807. In 1812 he was made earl of Mulgrave. His son, Constantine Henry (1797-1863), 2nd earl, was made marquess of Normanby in 1838. George Augustus, 2nd marquess (1819-90), was a Liberal M.P. and in turn governor of Nova Scotia, Queensland, New Zealand, and Victoria. In 1932 Oswald (b. 1912) became 4th marquess. An eldest son is called the earl of Mulgrave, from the family seat near Whitby.



1st Marquess of Normanby, British politician after H. P. Briggs, R.A.

Normanby, CONSTANTINE HENRY PHIPPS, 1ST MARQUESS OF (1797-1863). British politician. The son of Henry Phipps, 1st earl of Mulgrave, he was born May 15, 1797. Educated at Harrow and Trinity College, Cambridge, he

entered parliament in 1818. Earl of Mulgrave in 1831, in 1832 he became governor of Jamaica. In 1834 he was appointed lord privy seal, and during 1835-39 was lord-lieutenant of Ireland. He was home secretary under Melbourne, 1839-41; ambassador in Paris, 1846-52 and at Florence 1854-58. He died July 28, 1863. He wrote *A Year of Revolution* (1848), 1857.

Norman Conquest. Name given to the conquest of England by William I in 1066 and the succeeding years. It began with his victory at Hastings, and may be said to have ended with the march to Chester in 1070. Formerly it was regarded as introducing a completely new system into England, but the present view is that Norman influence, although considerable, was far from destroying all traces of English law and customs. See Armour; Bayeux Tapestry; England: History; Feudalism; William I. Consult *The Norman Conquest*, Freeman, 1867-79; *Anglo-Saxon England*, F. M. Stenton, 1943.

Normandie. French luxury liner. First put into service on the Havre-New York route in 1935, this 83,423-ton ship captured the blue riband of the Atlantic on her maiden voyage, breaking all records for passenger ships. At the outbreak of the Second Great War in 1939 the Normandie was lying in New York harbour; taken into protective custody, and seized in Dec., 1941, by U.S. coastguards, she was converted into an auxiliary ship and renamed the Lafayette. On Feb. 9, 1942, when 2,200 workmen were on board, a fire started on the promenade deck; the men made dramatic escapes, but many were injured. After burning for 13 hours the Normandie capsized, and was later disposed of for scrap.

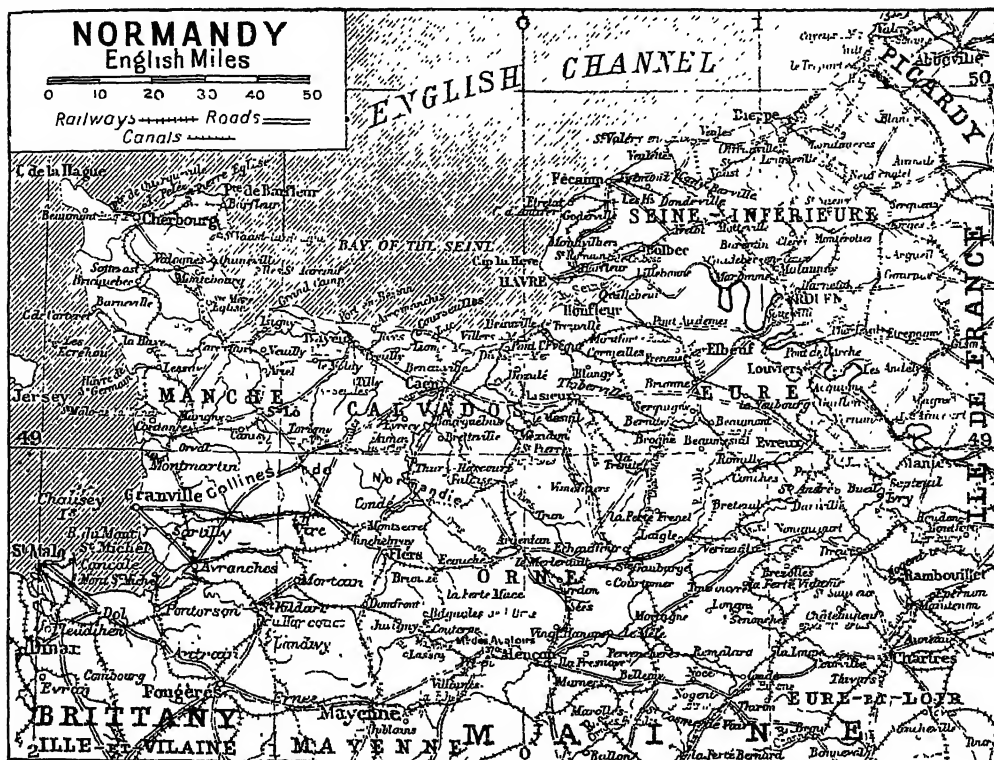
Normandy. Old province of France. It was one of the largest of those into which France was divided before the Revolution, and takes its name from the Normans or Northmen. The name is still used to describe the district. Normandy lies along the English Channel between Picardy and Brittany, and on the S. touches Maine, and in the S.E. the Île de France. Its departments are Seine-Inférieure, Eure, Orne, Calvados, and Manche. Its capital is Rouen; Caen, Bayeux, Lisieux, and Évreux, much damaged during the Second Great War, were interesting Norman towns. For many years the Channel Islands belonged to the duchy, and it was owing to this connexion that they became English.

Having been included in the Roman and the Frankish empires, Normandy was ravaged by the Danes or Northmen, who found an easy way for their boats along the Seine. Some of them settled on its banks, and in 912 King Charles the Simple made a treaty with their leader, Rollo, to whom he gave some land around Rouen. Thus Rollo founded the duchy of Normandy, which grew in size under his successors. They assimilated the French language and culture, and were often at war with their neighbours, the counts of Anjou. William the Conqueror, who became duke in 1035, added Maine to his possessions. In 1066 he was crowned king of England, and when he died in 1087 he left Normandy to his eldest son Robert, thus separating it from England. In 1106, however, Robert was beaten at Tinchebrai and captured by his younger brother, Henry I, and the two countries were again united. After Henry's death in 1135, his grandson, Henry II, had to fight for Normandy as for England, but when he became king in 1154 he was already duke.

Normandy, although ruled by the English king, had the king of France as its overlord, and the relationship naturally led to trouble. Both Louis VII and Philip Augustus coveted the great possessions acquired by Henry II, but were unable to take any of them from him, although they helped his sons to harass his life. The warfare continued during the reign of Richard I, and came to a climax in that of John. In 1202 Philip Augustus invaded Normandy, and when Rouen surrendered to him in 1204, it was all in his possession. The duchy was formally surrendered by Henry III (1259).

After John had been deprived of Normandy the land was without a duke, but in 1329 Philip VI appointed his son John to that office. During the Hundred Years War the duchy was a battleground, and in 1359, after the English successes, the French king promised to cede it. This arrangement fell through, and after Agincourt the English overran it and established an administration. But the Normans steadily resisted, and gradually the duchy was recovered by France.

For many years Normandy had its own assembly of estates, and there was a *parlement* at Rouen from 1499 until the Revolution. Before that time, however, the land was completely at one with the rest of France. In 1791 it was



Normandy. Map of the old French province and battleground of several historic wars

divided into departments. For the campaign in Normandy in 1944, see Caen; D-day; Europe, Liberation of; Falaise, etc. See also Channel Islands; Distaff; Northmen; William I.

Norman-French. Dialect of Old French spoken in Normandy and England. The Scandinavian settlers in Normandy adopted the French tongue in the 10th century, and the dialect which thus arose contained many words of Danish origin, and many phonetic peculiarities. It played an important part in the development of Old French literature, and was the dialect of many of the trouvères, including, perhaps, the author of the original Song of Roland. The metrical chronicles of Wace are 12th century monuments of Norman-French. Modern Norman speech preserves traces of the old dialect, especially in the Channel Islands, where an archaic form is used on ceremonial occasions.

Anglo-Norman is the name of the dialect spoken by the dominant class in England for about two centuries after the Conquest. Spoken by a small and scattered minority, it is remarkable for its irregularity and its tendency to

simplification. Its influence on English was much less than that of the Parisian-French which became current in official and noble circles in Henry III's reign, when Anglo-Norman was dying out.

Norman Lockyer Observatory. British observatory. With a site of 44 acres on Salcombe Hill, Devon, 565 ft. above Sidmouth, it is part of the University College of the S.W. of England.

Normanton. Urban dist. of the W. Riding of Yorkshire, England. It stands on the Calder, 10 m. S.E. of Leeds, and is an important rly. junction. The principal building is the church of All Saints, partly Perpendicular. There is a 16th century grammar school. Industries include coal mining and rly. work. Pop. 19,200.

South Normanton is a village near Alfreton, in Derbyshire, also a coal-mining centre. Another Normanton is near Derby, and there are places of this name in Rutland and Lincolnshire. Normanton-on-Soar and Normanton-on-Trent are villages in Notts.

Norrmanton. Town of Queensland, ranking as the chief place on the Gulf of Carpentaria, though it is 50 m. from the mouth of the

Norman river. There is steamer and air communication with Brisbane. Normanton is a port for mining and pastoral areas. Pop. 386.

Norn. In Scandinavian mythology, the name of the three goddesses of fate. Of the race of the giants, they ended the golden age of the gods. They cast lots over every infant and lay gifts in his cradle. One is malignant, the others are beneficent. They are akin to the Valkyries, the fairies, and the classical Parcae. Late literary myths represent them as Past, Present, and Future, and as daily watering the root of the world-ash Yggdrasil from the well of Weird or Fate.

Norrbotten. Län or co. of Sweden. It is the largest and northernmost co., being bordered by Finland, Norway, and the Gulf of Bothnia, and includes part of Lapland. The extensive forests and the iron mines of Gellivare are exploited, the numerous rivers and lakes transporting the lumber. Area, 40,754 sq. m. Pop. 229,661.

Norris, Sir John (c. 1547-97). English soldier. Younger son of Henry, Lord Norris, and known as Black Norris, he served with the Huguenots in France, under Essex

in Ireland, and in the Netherlands against Spain. After being lord president of Munster, he



Sir John Norris,
English soldier
After Zuccheri

returned to the Netherlands in 1585 at the head of an English army, was knighted by Leicester for relieving Grave in 1586, and fought at Zutphen. He was marshal of the camp at Tilbury in 1588, ambassador to the Netherlands, and leader with Drake of an expedition to Spain. He died at Mallow, July 3, 1597.

Norris's father belonged to an old Berkshire family prominent at court in Tudor times. His brothers were famous soldiers, and their figures are on the Norris monument in S. Andrew's Chapel, Westminster Abbey.

Norris, KATHLEEN (b. 1880). American novelist. Born July 16, 1880, at San Francisco, her surname being Thompson, she spent her childhood in Mill Valley in the Californian mts., and became a librarian and then a journalist, marrying C. G. Norris in 1909. Her first novel, *Mother*, was published in 1911, and she achieved a best-seller with *Saturday's Child*, 1914. Of some 80 novels, her later ones included *Burned Fingers*, 1945; *Over at the Crowleys*, 1946.

Norris Dam. Storage dam across the Clinch river, Tennessee, U.S.A. Part of the T.V.A., it was completed in 1937. 1,860 ft. long, 265 ft. high, it controls the flood waters of the river, the overflow being used to generate electricity.

Norristown. Borough of Pennsylvania, U.S.A., the co. seat of Montgomery co. It stands on the Schuylkill, 18 m. N.W. of Philadelphia, and is served by rlys. and the Schuylkill canal. Industrial prosperity is based on granite and marble quarries and iron deposits. Norristown was founded in 1785 and, never incorporated as a city, is the most populous borough in the U.S.A.: pop. 38,181.

Norrköping. Town of Sweden, in the län or co. of Östergötland. It stands at the head of the Bravik Fjord, an inlet of the Baltic, and is a junction 113 m. by rly. S.W. of Stockholm, with which it is also connected by steamer. It has a good harbour and ship-building yards, and trades in timber, granite, iron, and grain. The river Motåla affords power for

numerous factories. Norrköping was founded in 1384, is governed by municipal council, and is the fourth biggest place in Sweden. Pop. 78,344.

Norroy King of Arms. Officer of the Heralds' College, England. He was first heard of in the reign of Edward II, and, as the title indicates, had jurisdiction over England N. of the Trent. See *Heraldry: Heralds' College*.

Norsabite. Explosive of the non-nitroglycerine powder type. It is based on ammonium nitrate sensitised by T.N.T. Permitted for use in coal mines, it expedites drift cutting and ripping operations.

Norse. Adjective properly signifying Norwegian, the native form being Norsk, i.e. Nord-isk. It is applied usually to the older period of Norwegian history, including the age of the great migrations, often in a sense which includes the whole Scandinavian race. The Norse language, the old tongue of Norway, where it is now virtually extinct, was carried to Iceland, Greenland, the Orkneys, Shetlands, Hebrides, Isle of Man, and parts of the Scottish mainland, especially Caithness. It was ousted from Norway by Danish, and from Scotland by Gaelic and English, but lingered in the Orkneys and Shetlands until the 18th century.

Old Norse, one of the North Germanic group of languages, is the name given to the form of the language current before the 15th century, another name being Old Icelandic. While Iceland was the chief seat of Old Norse literature, some of the extant works were written in Norway, Greenland, and perhaps in the Hebrides. See *Iceland*; *Northmen*; *Norway*.

North. One of the cardinal points, one end of the earth's axis. The central point of the Arctic basin is the north terrestrial pole, directly above which the north celestial pole is marked approximately by the pole star. The north magnetic pole to which compasses point is more than 800 m. to the S. of the N. pole, somewhat N.W. of Boothia Peninsula, Canada.

North, BARON. English title borne since 1554 by the family of North. Sir Edward North was made a baron in 1554. His son Roger, the 2nd baron, was ambassador to France. Charles, the 5th baron, was made Baron Grey; but this title expired with his son, the 6th baron, in 1734. The 7th baron was a cousin, who was already Baron Guilford, and in 1752 was made earl of Guilford. The two titles were held together

until 1802, when the 3rd earl died. The barony then fell into abeyance, remaining so until 1841. It was then granted to Susan, daughter of the earl of Guilford. She and her husband, J. S. Doyle, took the name of North. The title again became extinct when the 13th baron, John Dudley, was lost with H.M.S. Neptune, as announced Jan. 3, 1942.

North, FREDERICK NORTH, LORD (1732-92). English statesman. Born April 13, 1732, son of



Frederick, Lord North,
English statesman
After Dance

Francis, 1st earl of Guilford, whom he succeeded in 1790, he was educated at Eton and Trinity College, Oxford. Entering parliament 1754, he was chancellor of the exchequer, 1767. Prime minister from 1770, his "King's Friends" were fiercely attacked but held office until 1782; this period saw the American War of Independence. In 1783 North formed a coalition with Fox, and held office April-Dec. He died Aug. 5, 1792. *Consult* Life, W. B. Pemberton, 1938.

North, CHRISTOPHER. Pseudonym of John Wilson (*q.v.*), professor of moral philosophy, Edinburgh, and contributor to *Blackwood's Magazine*.

North, SIR DUDLEY (1641-91). British economist. Son of Dudley, 4th baron North, he was born at Westminster, May 16, 1641, and educated at Bury St. Edmunds. He amassed a fortune in Turkey as treasurer of the Turkey Company. He returned to England in 1680, and became a well-known figure in London, being a sheriff of the City, and M.P. for Banbury. North was one of the earliest economists who advocated the doctrine of free trade. His *Discourses upon Trade*, published in 1691, foreshadowed the views of Locke and Adam Smith. He died, Dec. 31, 1691.

North, SIR THOMAS (c. 1535-c. 1601). An English translator. Younger son of Edward, Baron North, his fame rests almost entirely upon his translation of Plutarch's *Lives*, made from the French version of Amyot. The book was Shakespeare's chief source for Julius Caesar, Antony and Cleopatra, and other classical plays. North wrote in a vivid and powerful style, and was one of the makers of English prose.

NORTH AFRICA CAMPAIGNS, 1940-43

Lt.-Gen. Sir Giffard Martel, K.O.B.

The story of the fighting in North Africa during the Second Great War is here told from Gen. Graziani's advance into Egypt in Sept., 1940, until the surrender of the last Axis forces in Tunisia in May, 1943. See also Alamein; Eighth Army; Mareth Line; Montgomery; Tobruk; Tunisia, Battle of, etc.

So long as Great Britain had France as an active ally her position in the Mediterranean was reasonably secure; but when France was defeated in June, 1940, Wavell, British c.-in-c. in the Middle East, found himself unsupported, and outnumbered by the strong forces Italy had built up in Libya, estimated when Italy declared war on June 10 at over 215,000 men, while the British in Egypt totalled 36,000 men, under Gen. Sir H. Maitland Wilson. The foremost defended position in Egypt was at Mersa Matruh, 120 m. from the frontier with Libya, on which a small covering force was placed with orders to attack Italian frontier posts immediately on the outbreak of war.

A number of patrol engagements were fought during the summer, but the Italian commander Gen. Graziani decided not to launch his offensive until the heat had abated. On Sept. 13, the Italians advanced across the border near the coast. British mobile troops withdrew before the Italians, who took Sidi Barrani, Sept. 16, and proceeded to construct a series of fortified camps from Maktila, some 12 m. E. of Sidi Barrani, through Tummar E. and W., about 10 m. S.E. and S. respectively of Sidi Barrani, and Nibeiwa, about 5 m. S. of Tummar. To protect their communications the Italians constructed a group of camps at Sofafi and El Rabia some 25 m. S. of the coast and the same distance S.W. of Nibeiwa. Wavell had decided not to offer strong opposition until they reached the prepared defences of Mersa Matruh; but two months went by without further enemy activity.

WAVELL'S ADVANCE. In the meantime Wavell had been making preparations. Small reinforcements were sent out to him, but on the other hand he had, after the Italian invasion of Greece, Oct. 28, to send forces to that country. However, in Nov. he decided that the time had come to assume the offensive, in spite of his great inferiority in strength. He considered the enemy's defensive arrangements to be "thoroughly faulty," with camps not mutually supported spread out over a wide area; and his plan was to attack

round the S. flank, capture the enemy camps at Nibeiwa and Tummar, and then push on towards Sidi Barrani and cut off the enemy while a small force attacked Maktila from the E. As this was a difficult operation Wavell decided to carry out a rehearsal in the back areas. Ground was marked out showing the positions of the camps and defences. His plan of attack was then gone through on Nov. 25 and 26 as an exercise complete with umpires. No one but the two divisional commanders had any idea that this was a rehearsal for their attack on the enemy. Certain mistakes came to light and were to be corrected in the "next exercise," i.e. the actual attack.

Opposing Forces

For these operations the R.A.F. had two army cooperation squadrons, a squadron of Hurricanes and Lysanders for tactical reconnaissance, and a squadron of Gladiators for attacking opportunity targets. The Italians had a rather stronger air force. The British Western Desert force, commanded by Lt.-General Sir Richard O'Connor, consisted of the 7th armoured div., the 4th Indian div., and the 7th tank battalion; its total strength was 31,000 men, 120 guns, 225 tanks (mostly light), and 50 heavy infantry tanks (Matildas). The Italian force E. of the Egyptian frontier consisted of three Libyan divs., two Blackshirt and two Metropolitan divs., and an armoured group; total strength 80,000 men (63,000 Italians), 250 guns, and 120 tanks (mostly light).

The British approach, which began on the night of Dec. 7-8, was made in two night marches, the heavy infantry tanks starting two days earlier on account of their slowness. There was great danger that the movement would be seen from the air, but all went well. The approach on the last night was made in full moon and by the early hours of Dec. 9 the troops were in position. The guns opened at 7.15 a.m. The 7th tank battalion with the heavy infantry tanks advanced from the N.W. followed by infantry of the 11th brigade of the 4th Indian div. At 7.35 a.m. Matildas entered

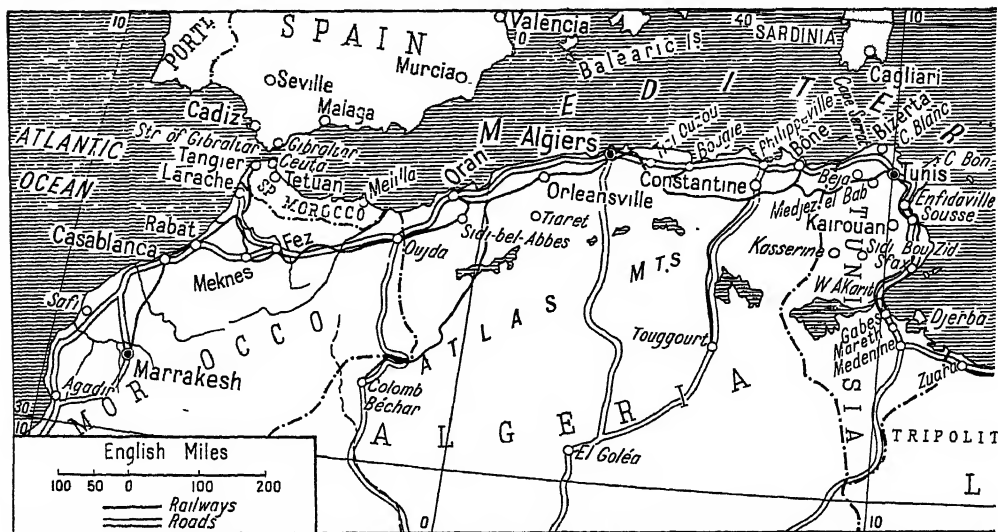
Nibeiwa and met some enemy tanks which they destroyed with ease. As they advanced they came under heavy fire, but the Matilda was at that time the most heavily armoured tank in the world, and the enemy anti-tank shells bounced off the armour. By 8.30 a.m. Nibeiwa was in British hands. The commander of the 4th div. now turned to attack the camps at Tummar E. and W., both subdued by dark in much the same way and with few casualties. Seeing the success of these operations, he also sent the 16th infantry bde., in reserve, to move N. to cut off Sidi Barrani.

During this day the 7th armoured div. had sent the support group to pin the enemy at Sofafi and one of the two armoured brigades (the 4th) was sent N. to cut the road just W. of Sidi Barrani. They reached their objective; but the 16th infantry bde. came under rifle fire and was seriously delayed. On Dec. 10 the 11th infantry bde. came up on their flank with some infantry tanks. At 1.30 p.m. the commander 4th div. decided to attack Sidi Barrani. This was an ambitious plan in view of the great distances the troops had already moved, but they were highly trained and elated with their successes. The attack started at 4.15 p.m. and the town was captured before dark. Dec. 11 was spent in mopping up the battlefield. The Sidi Barrani area was soon cleared; and Brig. Selby's force dealt with the Italians round Maktila. The enemy was withdrawing in many places towards the frontier, and the 7th armoured div. was much occupied sending out forces to cut them off. By Dec. 15 all enemy troops had been driven out of Egypt, and the battle of Sidi Barrani was over.

Italian Losses

The enemy forces, now concentrating in the area Bardia-Sollum-Capuzzo, consisted of four divs., with another at Tobruk. By Dec. 17 the greater part of them was behind the defences of Bardia, and the 7th armoured div. was already holding the exits to the W. Five enemy divisions had suffered heavy casualties or been broken up. Italian prisoners numbered 38,000, while British casualties were 133 killed, 387 wounded, and 8 missing.

The British supply system became increasingly difficult. The nearest railhead was at Mersa Matruh, and there was a shortage of mechanical transport. Gen.



North Africa Campaigns. Map of the N. African coast from French N. Africa in the West to Cairo and—

Wavell, however, gave the Italians no rest. The Western Desert force now became 13th corps. The 4th Indian div., sent to the Sudan, was replaced by 6th Australian div.

Bardia perimeter defences were 17 m. in length and consisted of a chain of concrete posts each of which was protected by wire and an anti-tank ditch. Infantry tanks were required for the attack; but the tank battalion was much under strength owing to casualties and breakdowns. A strong artillery bombardment was therefore essential, and it took 16 days to build up the ammunition dumps. The attack began at 5.30 a.m. on Jan. 3, 1941. The Australians broke through on the left on a narrow front after an intense bombardment. Tanks and fresh infantry units passed through and attacked the defences from the rear. The Italians fought stubbornly in places, but by the afternoon of the 4th the defences had fallen and the Australians were entering the town. On the 5th the last defenders surrendered. 45,000 prisoners, 462 guns, and 129 tanks were taken. Close support was received from the R.A.F., and the R.N. cooperated by a bombardment from the sea.

Tobruk, 75 m. away, was the next fortified place. The perimeter defences, similar to those at Bardia, were 27 m. long, and the 7th armoured div. very quickly passed round them to hold the exits on the W. The defences were strong, and full preparations for the attack had to be made, including bringing up ammunition, which

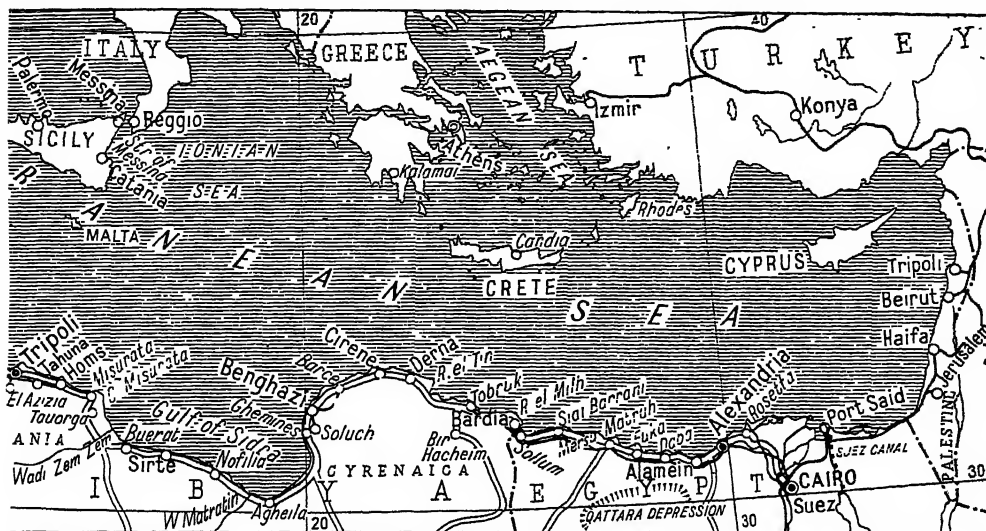
took 13 days. The attack began at 5.30 a.m. on Jan. 21 in much the same manner as against Bardia. The Australians advanced under a strong artillery bombardment. The heavy tanks were again of great value, though only 16 were now available. The R.N. and the R.A.F. again cooperated. Organized resistance ceased on Jan. 22; O'Connor's forces had taken 30,000 prisoners, 236 guns, and 87 tanks, and secured the use of a valuable seaport, although the Italians had done considerable damage to the installations.

After a short interval, the Australians were advancing again on the coastal road towards Benghazi behind the retreating Italians. The enemy had left some armoured forces at Mekili to guard his flank, but withdrew them on Jan. 27, and the 7th armoured div. advanced by the route thus left open. It had been instructed to wait for reinforcements and supplies at Mekili, but by Feb. 3 it was clear that the enemy was withdrawing from Benghazi, and the div., ordered to make for the coast without delay and intercept him, advanced straight on Msus, the first elements arriving there on Feb. 4, having covered 150 m. in 24 hrs. The going was exceptionally heavy and this move was a wonderful feat in the conditions. A detachment was sent on the 5th towards the coast near Antelat to form a road block. Another detachment was sent to Soluch; while the 4th armoured bde. went to Bada Fomm to take the enemy in flank. The

Italians began to appear next day, and at first tried to break through frontally; but the Rifle bde. and some artillery fought magnificently. The Italians then launched their tanks to try to clear a way round and met the 4th armoured bde. In the very exciting and critical battle of Bada Fomm reinforcements from the 7th armoured bde. arrived just in time to save the situation. On the morning of Feb. 7 the Italians surrendered unconditionally. Benghazi, meanwhile, had surrendered, Feb. 7, to the Australians advancing along the coast road. In two months the army of the Nile had advanced 500 m., destroyed an Italian army, and captured 130,000 prisoners, 400 tanks, and 1,290 guns for the loss of 500 dead, 1,373 wounded, and 55 missing.

While British troops had been driving the Italians out of Cyrenaica the Germans had been collecting powerful forces to attack Yugoslavia and Greece; and immediately after the fall of Benghazi Wavell was directed to undertake no operations beyond the W. frontier of Cyrenaica. On March 5 transfer to Greece of a large part of the forces in N. Africa began, leaving the British position in Cyrenaica very insecure.

During February and March it became evident that the Germans were also in N. Africa. Heavy German air attacks on Benghazi led to the decision in late Feb. to cease using it as a supply port, and all supplies had then to be brought from Tobruk, although shortage of transport was one of



—Alexandria in the east, the scene of Axis and Allied advances and retreats in the Second Great War

the chief difficulties in the Middle East. British forces lying just E. of Agheila at the end of March comprised the 2nd armoured div. (less one bde., in Greece), much of it inexperienced and all of it poorly equipped, and a support group. Two bdes. of the 9th Australian div. were also forward, the third bde. being in Tobruk owing to lack of transport.

ROMMEL'S FIRST ADVANCE. Lt.-Gen. Neame was now commanding the British forces in Cyrenaica and his orders were, if attacked, to fight a delaying action and withdraw if necessary. On March 31 the enemy (now with Rommel as c.-in-c.) began his counter offensive with a German light armoured div. and two Italian divs. By April 3 they were advancing on Msus, and on the 4th Neame decided to withdraw to the line Derna-Mekili. The enemy followed closely. On the 7th the 9th Australian div. withdrew in good order to Tobruk. An Indian motor bde. and certain other elements holding Mekili fought off a series of small attacks, but, also on the 7th, were ordered to withdraw to El Adem. Part of the force withdrew, but the remainder, including the H.Q. of 2nd armoured div., was captured on the 8th. During the night of April 6-7, Gens. Neame and O'Connor, in consultation at Barce, were surprised and taken prisoner.

Wavell decided that Tobruk must be held, and a bde. of the 7th Australian div. was sent by sea to reinforce the defence. The remainder of the British forces

were driven back on Sollum in Egypt, and from April 11 Tobruk was invested.

There was no major activity on either side until June. The British forces now again included the 4th Indian div. and a reformed 7th armoured div. which was much under strength in tanks and not fully trained to the use of those that had recently arrived. On June 15 the British attacked and captured Capuzzo, but could not hold it. Useful information was, however, obtained. It was discovered that the Germans had mounted 50 mm. guns in all their tanks, in place of 37 mm. guns. The 50 mm. gun fired a 4½-pr. shell which could penetrate British tanks at 1,500 yds., whereas the British tanks with 3-pr. guns had to close to 800 yds. to penetrate the German tanks.

AUCHINLECK'S CAMPAIGN. On July 5 Gen. Sir Claude Auchinleck took over command of the Middle East, Wavell relieving him as c.-in-c. in India. Both sides in Cyrenaica were preparing for a renewal of operations in the autumn, the only important operation undertaken meanwhile by the British being the complete relief by sea of the Tobruk garrison with new units during the moonless periods of Aug., Sept., and Oct. The British forces, grouped in three corps, were formed into the 8th army under Gen. Sir Alan Cunningham. The 13th corps under Gen. Godwin Austen had the 4th Indian and the New Zealand divs., and the 1st army tank bde. The 30th corps under Lt.-Gen. Norrie

was an armoured corps with the 7th armoured div., the 4th armoured bde., 1st S. African div., and Guards bde. The garrison of Tobruk was the 70th div., the 32nd army tank bde., and a Polish infantry group. The 2nd S. African div., in reserve, was not yet fully trained. The British air forces now consisted of 11 squadrons of light bombers, 17 of fighters, and 6 of medium bombers.

The enemy forces holding the frontier defences were an Italian div. and some German troops. Concrete pill boxes behind strong wire obstacles ran along the whole frontier, with field defences from the sea to Sidi Omar, a front of 25 m. On the frontier 40 m. S. of Sidi Omar lay Maddalena. Bardia was held by Italian forces.

The ground is very broken between Bardia and Tobruk, and a high ridge with a double escarpment runs all the way along about 10 m. inland. S. of this ridge there is nothing but open flat desert with very few features. Between this ridge and the sea Rommel had placed the 15th and 21st panzer divs. Four Italian divs. and one German surrounded the outer defences of Tobruk. The Italian Ariete armoured div., stiffened with German officers, was at Bir el Gobi. There was an important feature of high ground running from El Adem to Sidi Rezegh about 15 m. S. of Tobruk, the W. end of the high ridge parallel to the coast. Gabr Saleh was an important point between Sidi Omar and Bir el Gobi. The Axis forces outnumbered the

British considerably; but the Italians among them were of doubtful fighting quality. In tanks the British had a small superiority in numbers, but the German tanks all had 50-mm. guns while the British still had only 3-prs. The German armoured forces were greatly superior in strength of personnel and weapons—particularly in anti-tank guns. It was a bold but correct action to assume the offensive.

British Advance into Libya

At dawn on Nov. 18 the 30th corps crossed the frontier near Maddalena, behind a screen formed by three armoured car regiments. The 7th armoured div. reached Gabr Saleh that evening, having covered 100 m. The 4th armoured bde., however, had been drawn away 25 m. to the E. in a protective rôle, and was already out of supporting distance of the div. The 1st S.A. div. was following in support of the 7th armoured div.

In preparation for the battle, British air forces had been fighting for air superiority, which they had gained to a large degree. As a result the advance came as a tactical surprise, and there was little interference from enemy air forces. On Nov. 19 the 30th corps was instructed to advance towards Tobruk. One brigade of the 7th armoured div., diverted to attack the Italians at Bir el Gobi, fought an indecisive action there. The remainder of 7th armoured div. advanced and seized Sidi Rezegh.

On Nov. 20 the German armoured forces debouched from the N. and a strong column was seen to be advancing on the 4th armoured bde., which was isolated. The bde. which had been fighting at Bir el Gobi was moved to reinforce the 4th armoured bde. A small action resulted; but next day the Germans diverted their forces to Sidi Rezegh, held by the British with one armoured bde., the S. Africans having not yet arrived. Lack of concentration at the decisive point found the British in a serious situation. On Nov. 22 all their forces were concentrating on Sidi Rezegh, but too late. The initiative had passed to the Germans who, on the 23rd, attacked Sidi Rezegh in very superior strength, and also the S. Africans, who had not yet reached the high ground. Fierce fighting occurred in which acts of great gallantry were performed by the armoured forces. German tanks broke into the lines of the S. African troops, who knocked many of them out at the muzzles

of their guns. But in the end the S. Africans were overrun, and the Germans were left in possession of the battlefield and of the high ground round Sidi Rezegh.

At this stage Rommel made a mistake. He was in considerable strength at Sidi Rezegh, with his 15th and 21st panzer divs. in hand. The British armoured forces were lying on the desert collecting themselves after their ordeal. The S. Africans were re-forming near Gabr Saleh. Rommel could undoubtedly have attacked and defeated the British armoured bdes. in detail before they could re-form and prepare themselves for battle. Instead, he chose to march straight through with both his armoured divs. and move on Shefferzen, just S. of Sidi Omar. This caused considerable confusion. Various headquarters had to scatter and clear out of his way, but the Germans made no attempt to mop up the troops. Heavily attacked from the air, at Shefferzen they met the 4th Indian div. There was nothing else between them and Cairo. Gen. Auchinleck came up to the front to restore confidence. The panzers attacked. The Indians held their ground. Fierce fighting ensued, and the Germans were repulsed with heavy losses.

Battle for Sidi Rezegh

While these events were happening the 13th corps had been advancing round Sidi Omar. The N.Z. div. had been making for Sidi Rezegh to support the armoured forces. It did not arrive in time to do so, but when Rommel advanced with his panzer divs. the New Zealanders took Sidi Rezegh, Nov. 26, and next day met a party which made a sortie from Tobruk.

After his failure against the Indian div. Rommel ordered the 15th and 21st panzer divs. to return to their bases on the coast and reft. By this time the British armoured forces had recovered. Every available man, gun, and tank was used to pursue these defeated German forces as they withdrew; heavy casualties were inflicted. The Germans were now concentrating normal formations to attack Gen. Freyberg and his small force of New Zealanders at Sidi Rezegh. An attempt was made by the 30th corps to reinforce them with the S.A. div., but before they could arrive Sidi Rezegh was again lost.

Cunningham was replaced in command of the 8th army on Nov. 26 by Lt.-Gen. Ritchie, who added the 4th Indian div. to the 30th

corps and instructed it to retake Sidi Rezegh from the S. with the help of the armoured forces, now reinforced. About this time Rommel decided to pull out, in order to save the highly skilled personnel of his armoured forces. His withdrawal meant deserting the garrisons of Bardia, Sollum, and Halfaya, but these were for the most part Italians. He established strong rearguards on his S. flank which were overcome by the 30th corps, while the 13th corps followed up his retreating forces in the N. Tobruk was cleared on Dec. 7, Benghazi was recaptured Dec. 24, and the pursuit went on to Agheila near the Tripolitania border. Of the garrisons, that at Bardia fell on Jan. 2, 1942; Sollum was captured on Jan. 12, Halfaya on the 17th.

Rommel had saved fewer than 50 tanks out of his original 400. He lost 10,500 German and 26,000 Italian prisoners, and also some 24,000 dead and wounded. British casualties were c. 18,000.

ROMMEL'S SECOND ADVANCE.

Driving the Axis powers out of Cyrenaica for a second time had again opened the way for an advance along the N. African coast. The rly. was extended to Tobruk with great speed. Administrative preparations were in hand. But events in another field again upset plans in N. Africa. Japan had attacked the U.S.A. at Pearl Harbour, and the whole situation in the Pacific was critical. Burma was threatened. Australia was in danger. Two Australian divs. and the 7th armoured bde. were sent to the Far East. Rommel meanwhile was being reinforced. In Jan., 1942, he advanced from Agheila. Benghazi was evacuated on the 29th and the British should have withdrawn farther; but they were anxious to retain airfields near Derna for the protection of Malta. In Feb., however, they were back to the Gazala-Bir Hacheim line. The 13th corps under Gott had the 1st and 2nd S.A. divs. and the 50th div. with the 1st army tank bde. and the 9th Indian infantry bde. Norrie had the 1st and 7th armoured divs. and some independent motor and infantry bdes., including the 1st Free French bde. at Bir Hacheim.

On May 26 Rommel attacked, advancing with his armour round the S. flank of the British line. When this outflanking move was held Rommel pierced the line farther N. On May 30 Norrie was fighting a fast moving battle in the S. with his armour still outgunned

against superior enemy forces, and had to withdraw at many points. At Bir Hacheim the Free French were holding their ground against heavy attacks, but immediately to their N. the Germans and Italians were making headway. In about the centre of the whole battlefield and just N. of the Capuzzo track there was a piece of ground which came to be called Knightsbridge. The 201st Guards bde. was well established at this place. Intense fighting was taking place to the S. of this locality and E. of Bir Hacheim, and this area was called the "cauldron." The 150th infantry bde. (50th div.), which was holding an isolated position in the forward area, was overwhelmed on June 1, and the enemy thus secured a salient in the British line. On the 4th-5th an assault was made on this salient, but repulsed: the full strength of the Germans in this area had not been appreciated. But the Gazala line still held, though the French at Bir Hacheim were isolated. On June 6 an armoured battle began round Knightsbridge, and enemy assaults on Bir Hacheim were renewed. On the 10th Ritchie ordered the French to evacuate Bir Hacheim, and the additional pressure then brought upon Knightsbridge forced the British to withdraw from there on the 14th. British armour in the Acroma area had been reduced to 30 cruiser and 20 infantry tanks, while the enemy probably had twice as many. The security of the British line had depended on a strong armoured backing, the loss of which made a withdrawal on the whole front inevitable.

Surrender of Tobruk

An attempt to hold a line Tobruk - El Adem southward failed, and Tobruk was again invested. Maj.-Gen. Klopfer, commanding the 2nd S.A. div. since May 15, and appointed to command the fortress, was told to defend it at all costs. The enemy attacked on June 20, and next day Tobruk capitulated, some of the units fighting on, however, and a few succeeding in breaking out to rejoin the 8th army. Rommel was able to take up the pursuit immediately. Auchinleck favoured an attempt to hold the frontier, but without armour Ritchie felt this could not be done, and his decision that he must withdraw on Mersa Matruh, where he proposed to fight a decisive battle while sending on H.Q. 30th corps to control the completion of the Alamein position, was endorsed by the Middle East defence committee.

However, Auchinleck, who took over control of the 8th army from Ritchie on June 25, abandoned the intention to fight at Mersa Matruh and withdrew the whole of the British forces to Alamein. There on Aug. 12 Auchinleck handed over command of the 8th army to Lt.-Gen. B. L. Montgomery; while on Aug. 15 Gen. Harold Alexander assumed command in the Middle East. On Aug. 10 Churchill, on his way to Moscow, met Alexander in Cairo. He gave him a directive: "Your prime and main duty will be to take or destroy at the earliest opportunity the German-Italian army commanded by Field Marshal Rommel together with all its supplies and establishments in Egypt and Libya."

ALEXANDER'S CAMPAIGN. Montgomery made himself familiar with the desert, and soon inspired all ranks of the "brave but baffled" 8th army with his own enthusiasm and confidence. At the beginning of Aug. it consisted of the 30th corps (now made up of the 9th Australian, 1st S.A., and 5th Indian divs., reinforced by the 23rd armoured bde. in an infantry support rôle) and 13th corps (2nd N.Z. div. of two bdes. and the 7th armoured div.). The line it held lay from Alamein (meaning the twin cairns), a halt on the desert rly. to Mersa Matruh, to the E. end of the Ruweisat ridge and then S. by W. over flat ground, interrupted by steep-sided depressions, of which Deir el Munassib was the chief, to the Qattara depression. Behind this part of the front lay the strongly defended Alam el Halfa ridge which, reaching a height of 430 ft. and commanding the country to the S., was held by an infantry bde.; a second bde. occupied reserve positions on Ruweisat ridge. For the defence of the Delta there were three armoured and three infantry divs., and of these Alexander brought forward on Aug. 15 the 44th infantry and the 10th armoured divs.

Axis forces in Egypt, under the nominal command of Mussolini, but the actual command of Rommel, were the German Afrika Korps (15th and 21st panzer divs.), the Italian 10th, 20th, and 21st corps.

On the night of Aug. 30 Rommel launched his offensive. A position on Ruweisat ridge was captured by parachute troops and lost again to the 5th Indian div. by dawn. A feint to the N. against the Australians failed. At 1 a.m. on Aug. 31 Rommel began a drive in the S. with his armoured forces. By a

ruce, a false map had been allowed to fall into the enemy's hands, and acting on it, as Gen. von Thoma (commander of the Afrika Korps, who was taken prisoner in Nov.) later admitted, Rommel did not bypass the British defences and drive N.E. on to Cairo, which was what he had been expected to do. Instead he launched a heavy attack upon them. They were well organized; and the German tanks now had to meet the fire of 6-pr. guns. They were severely defeated, and withdrew slowly and stubbornly until on Sept. 7 the battle was called off with Rommel's front slightly advanced in the S. to a line running from the E. end of Deir el Munassib to include the peak of Himeimat. During Sept. Rommel returned to Germany a sick man, and his place was taken by Gen. Stumme.

Montgomery's Preparations

Montgomery now prepared to assume the offensive. For this purpose 13th and 30th corps were to be used as infantry with some armour; a third corps, 10th, was to be an armoured *corps de chasse*, and to include 1st, 8th, and 10th armoured divs., and the N.Z. div. as motorised infantry. On Sept. 3, 300 Sherman tanks had arrived at Suez from the U.S.A. and 10th corps was assembled some 50 m. in the rear to undergo training and re-equipment, while the remaining troops from the Delta were brought forward to acclimatise them to the desert in which they would now have to fight. The R.N. and the R.A.F. raided the enemy's shipping, and sea and overland raids, troublesome to the enemy though abortive in effect, were made on Tobruk, Benghazi, and Barce.

The supply services that would be needed when the enemy was in flight were fully prepared; and elaborate measures were taken to conceal the actual plan of attack and lead the enemy to believe that its main feature would be an out-flanking movement in the S. instead of the intended direct attack in the N. The date selected as D-day was Oct. 23: full moon was on the 24th and good light was needed for the work the infantry had to do in clearing a passage through the enemy minefields for the armour. By this time also the Allies were about to assume a wider offensive. Invasion of the N. shore of Africa from the W. had been planned for Nov. 8, and it was considered that, if the attack at Alamein were made a fortnight ahead of that date, the enemy's forces in Egypt should by then

have been for the most part destroyed and he would have had insufficient time to bring in any significant reinforcements.

The Axis troops were spread fairly evenly along their whole front when nearly a thousand British guns opened up a 15-min. barrage at 9.40 p.m. on Oct. 23. Twenty mins. later 13th and 30th corps advanced to the attack. 30th corps cleared two corridors through the enemy defences as planned, though somewhat behind schedule owing to the density of the minefields; and the armoured brigades went through. The 13th corps to the S. was not so successful; but it was containing the southern group of enemy armour and was ordered by Montgomery not to press the attack, but to continue creating a diversion.

Rommel's Return

Stumme died of a heart attack on Oct. 23, and during a pause which Montgomery made for reorganization and regrouping on Oct. 26, Rommel arrived back. He endeavoured at once to carry out a manoeuvre he had often used successfully before—a mass tank attack in the afternoon out of the sun. But continuous bombardment by the R.A.F. and artillery fire disrupted his concentrations of armour. At 1.05 a.m. on Nov. 2 Montgomery launched a new attack, and at Tel el Aqqaqir occurred the biggest clash of armoured formations in the 11-day battle of Egypt. The British losses were heavy, but the enemy's losses were crippling. Then followed a German retreat and a British pursuit. Mersa Matruh, evacuated by the enemy, was re-entered on Nov. 8. At the same moment, the first Allied troops were coming ashore 2,000 m. to the W. in French N. Africa (*v.i.*).

The whole of Cyrenaica was in British hands by Nov. 25, and all the way the retreating enemy had been relentlessly attacked from the air, his fighters and his transport planes shot down. The next enemy position was at Agheila, the strongest in Libya. But by this time Rommel had under his command only some 25,000 Italians and 10,000 Germans, with 60-70 tanks; and the success of the Allies in establishing themselves in French N. Africa made it impossible to send him reinforcements from overseas.

Preparations to attack Agheila, Montgomery estimated, would take until Dec. 16. Heavy enemy demolitions and the effect of R.A.F. bombing were rapidly overcome :

by Dec. 1 the railhead had been brought forward to Tobruk, and 3,000 tons of Nile water were being delivered daily 25 m. W. of Mersa Matruh; the first ships entered Tobruk and Benghazi four days after their recapture, on Nov. 13 and 20. But Agheila is 150 m. from Benghazi and 300 m. from Tobruk, and motor transport remained a limiting factor.

When Dec. began, however, there were clear indications that the enemy meant to draw out. On Dec. 12 the N.Z. div. was sent off on a desert track to pass the enemy's landward flank and strike N. to cut the road at the Wadi Matratin some 60 m. W. of Agheila; and on that night the enemy began to withdraw, leaving mines, booby traps, and demolitions in such profusion that the troops making the frontal attack on the 14th took until the evening of the next day to cover the 30 m. from Mersa Brega to Agheila. Later on the 15th the N. Zealanders reached the wadi, but their difficulties in deploying by night in unknown country gave a large part of the enemy's rearguard still to the E. the chance to break up into small sections and race through breaks in the N.Z. deployment so that, despite losses, he got away the bulk of his forces. Pursuit continued, held up by demolished bridges and culverts over the numerous minestrewn wadis. There were skirmishes round Noflia on Dec. 18 and 19, when the enemy began to retire on Buerat. The 15th panzer div., left to cover Sirte, withdrew when an armoured car regt. was sent forward to work round the S. of Sirte, taken without opposition on Christmas day. Similar outflanking movements by armoured cars forced the enemy back to Buerat by Dec. 30.

8th Army's Dash for Tripoli

By this time the Axis had decided to evacuate Tripolitania and put all its forces into holding Tunisia; but Alexander was unaware of this, and it was decided that a two weeks' delay was necessary to bring up sufficient supplies, especially of petrol, from Benghazi, now 600 m. away, before the dash on Tripoli could be made, a delay during which Montgomery employed his Long Range Desert Group in reconnoitring in what was totally unknown country.

The attack began on Jan. 15, 1943; but the enemy was already moving W. and by the evening, in spite of some opposition, the 8th army had seized the main crossing of the Wadi Zem Zem. By the 19th

Rommel was standing on the line Homs-Tahuna, and in the evening of that day the 51st div. reached Homs. Again an outflanking armoured movement was made: it called off the enemy armour to the S.W. of Tahuna while a parachute bde. was moved to the Homs area, on which another British armoured bde. was moving. But the road W. of Homs winds for 35 m. through ravines and had been so thoroughly demolished that a rapid advance was impossible. Sharp rearguard actions had to be fought also. The outflanking column encountered stiff resistance; but at 5 a.m. on Jan. 23, three months exactly since the offensive opened 1,400 m. to the E., the 11th Hussars (the "desert rats") from the S., the 1st Gordons from the E., entered Tripoli. At 9 a.m. Montgomery received the formal surrender of the Italian authorities. The city had been little damaged, and the British military administration assumed the govt. of the city and prov. in an atmosphere of calm. By the end of the month, aided by a column of Fighting French under Gen. Leclerc which had invaded the country from the Chad territory, and conquered the Saharan prov. of the Fezzan between Jan. 4 and 29, Tripolitania was cleared.

TUNISIAN CAMPAIGN. The Allied expeditionary force which landed on Nov. 8, 1942, near Casablanca, at Oran, and at Algiers, was brought in two convoys, one from the U.S.A. and one from Great Britain, totalling some 500 transports and more than 350 escorting warships—at that time the largest armada ever assembled. Yet secrecy had been maintained down to the actual landing. The force was under U.S. command. Reports made after a secret landing in N. Africa from a British submarine by Maj.-Gen. Mark Clark (U.S. army) and six other British and U.S. officers had led to the belief that this would be less likely to lead to resistance by the Vichy French officials who controlled French N. Africa. The force which landed at Algiers, however, included a British bde. group which was to be the nucleus of the British 1st army.

The French army did oppose the landings; but on Nov. 10 Admiral Darlan, Vichy defence minister, who happened to be on a tour of inspection in N. Africa, agreed to an armistice and ordered all resistance to cease.

Gen. Eisenhower, the c.-in-c., decided to make a dash for Tunis, but by Nov. 10 already German troops were beginning to arrive in

Tunisia, at first by air, without resistance from the Vichy authorities; and after reaching Djedeida, only 12 m. from Tunis, on Nov. 28, the Allies were driven back by enemy tanks and dive bombers to Medjez el Bab (the ford of the pass). Axis forces were being reinforced much more rapidly than Allied, and with their S. flank at Sidi Bou Zid, the Allies now spent two months in consolidating the N. position and beating off German attempts to get round the S.

In accordance with decisions taken at a conference of the combined staffs with Churchill, Roosevelt, and Eisenhower held at Anfa near Casablanca on Jan. 14, and attended by Alexander, the 8th army came under Eisenhower's command when it entered Tunisia, and an army group H.Q. under Alexander's command (known as 18th army group—1st under Gen. Kenneth Anderson, 8th under Montgomery) was set up to co-ordinate the British, French, and U.S. forces in Tunisia. Alexander also became deputy commander of the Allied expeditionary force. At about the same time the Axis created "army group Africa," under Rommel, with the 5th panzer army commanded by Gen. von Arnim, and the 1st (Italian) army (German Afrika Korps, Italian 20th and 21st corps, which had been driven out of Libya) commanded by the Italian Gen. Messe.

Alexander assumed command in Tunisia on Feb. 19. At that time the battle of the Kasserine pass was raging in the S., but by the end of the month the pass, Sbeitla, Kasserine village, and Feriana had been reoccupied. In the last days of Feb. Rommel attacked in the N. towards Medjez el Bab, Béja, and the Gebel Abiud ("Longstop Ridge"). He achieved some success; but all the thrusts were held. Eighth army meanwhile had occupied Medenine on Feb. 18, and by the 24th was in contact with outposts of the Mareth line. On March 6 Rommel attempted to recover Medenine. It was his last battle in Africa, and he lost it. About the 19th he handed over his command to von Arnim, and returned to Germany. Then followed Montgomery's successful attack on the Mareth line, March 20-28, his capture of Gabes March 29, and the battle of the Wadi Akarit April 6, which forced Messe to retire to Enfidaville. On April 7 a U.S. patrol from a force which had advanced from Feriana to capture Gafsa on March 17 and El Guetar

on the 18th, met a British patrol of 8th army: the Allies had driven right across Africa.

By April 13 leading Allied troops were in touch with the enemy defences N. of Enfidaville, and the whole coastal plain was in Allied possession. As Alexander prepared for the final assault the enemy, some 250,000 strong, was now contained within a line running from the coast E. of Cape Serrat through Sidi Nsir, Medjez el Bab, due S. and then due E. to just N. of Enfidaville. By this time, the Allies had established complete air superiority. Eighth army attacked at 9.30 p.m. on April 19, capturing Enfidaville next day; this was the culmination of an 1,800 m. advance in six months, during which it had fought numerous and always successful battles.

On the night of April 20-21 the enemy made his last attack—between Medjez el Bab and Goubellat. It was a failure; and on the 22nd the 1st army attacked in its turn and slowly forced its way forward in heavy fighting. On May 7 British troops entered Tunis, U.S. troops Bizerta. Some thousands of the enemy retired into Cap Bon (*q.v.*) pen. in the hope of escaping by sea and air; after severe fighting during May 8-10 for the Hammam Lif defile they were rounded up. Mass unconditional surrenders began on the 12th. That day von Arnim surrendered; next day Messe did. A quarter of a million men, more than half Germans, laid down their arms; 663 escaped. On May 13 Alexander sent a signal to Churchill, "Sir, it is my duty to report that the Tunisian campaign is over. All enemy resistance has ceased. We are masters of the North African shore."

Northallerton. Market town and urban dist. of the N. Riding of Yorkshire, England. It is 30 m.



Northallerton arms

N.N.W. of York by rly. and is a junction, being the capital of the N. Riding. The chief building is the cruciform church of All Saints, mainly of the 12th century, with a fine Perpendicular tower. There are a hospital founded in the 15th century and a grammar school, while near are the remains of a Carthusian priory, Mount Grace (*q.v.*). The industries include tanning, brewing, malting, and engineering works; also the making of saddlery and other

leather goods. Standard Hill, 3 m. to the N., was the scene of the battle of the Standard (*q.v.*), 1138. Northallerton was the property, in the Middle Ages, of the bishops of Durham, and they held the manorial rights until 1865. They had a palace here, and there were at least two religious houses in the town. It was represented in parliament by two members until 1832, and by one until 1885, when it was disfranchised. Market day, Wed. Pop. 4,800.

Northam. An urban dist. of Devon, England. The dist., which takes in Westward Ho, Appledore, and Orchard Hill, stands near the left bank of the Torridge, 1½ m. N. of Bideford. Pop. 5,500. Another Northam is in Hampshire, part of the co. bor. of Southampton.

North America. The N. American continent, stretching from longitude 170° W. to 52½° W. and from latitude 80° N. to 15° N. It covers an area of approximately 8,350,000 sq. m. and has a pop. estimated at 163,000,000. Politically it is divided from E. to W. N. of 49° and the Great Lakes is (except for Alaska and Newfoundland) the dominion of Canada. Alaska is a dependency of the U.S.A., while the U.S.A. proper stretches from the 49th parallel to the borders of Mexico. The republic of Mexico, occupying the S. portion of the continent, extends from the boundary of the U.S.A. to Guatemala. For details of physical, geographical, and political features, see Alaska; America; Canada; Mexico; United States of America.

Northampton. County borough of Northamptonshire, England, also the county town. It stands on the left bank



Northampton arms

of the Nene, 66 m. N.N.W. of London, and is served by rly. The chief buildings in the borough are four parish churches: S. Peter's, a fine building, mainly Norman; S. Giles, varied in style and of somewhat later date; All Saints, rebuilt in Wren style after the fire of 1675; and the round church of S. Sepulchre, built by crusaders. There is a modern R.C. cathedral, by Pugin, but incomplete. S. John's hospital, founded 1137, is an interesting medieval building. The county hall dates from the 17th century, and the grammar school from the 16th. The town hall is 19th century Gothic, and the municipal buildings, museums, and

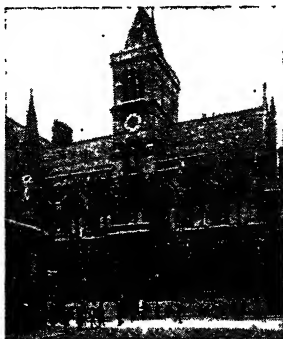
corn exchange are modern. The town has one of Europe's biggest market squares, and its public parks include the race-course and Abington Park. It has a service of motor buses, two theatres, and several cinemas. The chief industry since the 13th century has been the manufacture of boots and shoes. Others include tanning, brewing, iron founding, brick-making, colour printing, plastics, and light engineering.

Northampton began as an English settlement. After the Norman Conquest a castle was built here, and later the kings held parliaments therein. It was made a corporate town in the 12th century, and sent two members to parliament until 1918, when the representation was reduced to one. It was made a co. bor. in 1888. In 1675 much of the town was destroyed by fire. At Hardingstone, 1 m. S., is one of the Eleanor crosses, and near the town were several religious houses. Market days, Wed. and Sat. Pop. est. 104,700.

Northampton. City of Massachusetts, U.S.A., the co. seat of Hampshire co. It stands on the Connecticut R., 17 m. N.N.W. of Springfield, and is served by two rlys. Now a pleasant, cultivated New England town with wide streets, it was celebrated early in the 18th century as the home of Jonathan Edwards, the Puritan divine who led America's first revival movement. Smith College for women, opened 1875, is one of the largest resident women's colleges in the world. Pop. 24,525.

Northampton, ASSIZE OF. Body of instructions amounting in practice to laws, issued by Henry II and his advisers, at Northampton, in 1176. It was an expansion of the Assize of Clarendon (*q.v.*), and was in the form of directions to the judges about to go on circuit throughout England. The punishments to be inflicted on criminals were made more severe, and the powers of the sheriffs curtailed, while other articles dealt with questions of land tenure and dower.

Northampton, BATTLE OF. Fought July 10, 1460, during the Wars of the Roses. The Lancastrian host, with which was Henry VI, was encamped in a protected



Northampton. The Town Hall, built in 1364

position in some fields outside Northampton, when the Yorkists, under Warwick and the future Edward IV, who had just returned from exile, found and attacked it. The fight was soon over, for Lord Grey de Ruthyn turned traitor, and with his help the Yorkists got within the entrenchments of their foes, inferior in every way. The duke of Buckingham and about 300 other Lancastrians were slain.

Northampton, EARL AND MARQUESS OF. English titles borne by the family of Compton since 1618 and 1812.

There was an earl of Northampton in the time of William the Conqueror, and later the earldom became hereditary in the family of Bohun, whose male line came to an end in 1373. In 1547 William Parr was made marquess of Northampton. A brother of Catherine Parr, he was made a baron in 1539, and was also earl of Essex and a leading man under Edward VI. A supporter of Lady Jane Grey, he was sentenced to death under Mary, but the sentence was not carried out, and he died Oct. 28, 1571.

The title of earl of Northampton was revived in 1604 for Henry Howard, on whose death in 1614 it became extinct. In 1618 William Compton was made earl. He was



Spencer Compton, 2nd Marquess of Northampton

the son of Sir Henry Compton, who was created Baron Compton and was lord president of the marches of Wales. From James, the 3rd earl (d. 1681), who fought for Charles I, the earldom passed to Charles, the 9th earl. In 1812 he was made a marquess and his descendant still holds the titles. Spencer, the 2nd marquess (1790-1851), was president of the Royal Society; William, the 5th marquess



William Parr, Marquess of Northampton

(1851-1913), was a philanthropist and, before succeeding to the title, a Liberal M.P. During 1880-82 he was lord-lieutenant of Ireland. In 1913 the title descended to William Bingham Compton, the 6th marquess (b. Aug. 6, 1885). The family seats are Castle Ashby, Northampton, and Compton Wynnyates (*q.v.*), Warwickshire. The marquess's eldest son is called Earl Compton.

Northamptonshire. County of England. An inland and eastern co., its area is 998 sq. m. The surface is undulating except in the soke of Peterborough, which is in the fen country. The highest point is Arbury Hill, near Daventry.

The principal rivers are the Welland, dividing the county from Leics., Rutland, and Lincolnshire, and the Nene. The Avon, Cherwell, Leam, and Ouse rise in the county, which has rly. service and is also served by the Grand Union canal.

Northampton is the co. town; other large places are Peterborough, Kettering, and Wellingborough. Higham Ferrers, Towcester, Oundle, Daventry, and Brackley are small boroughs, and there are a number of urban districts. The county has much fertile soil, wheat and barley being grown and cattle and sheep reared on a considerable scale. Boots and shoes are made in the towns and villages. It is famous as a hunting county. For the purposes of administration Northamptonshire is divided into two counties, each having a county council. One is Northampton proper and the other the Soke of Peterborough. Together they elect 4 M.P.s, and 1 for Northampton.

In addition to the cathedral at Peterborough the county has many fine churches, and contains Fotheringhay, Holdenby House, Burghley House, Althorp, Castle Ashby, and Sulgrave Manor, ancestral home of the Washington family. There are remains of castles at Barnwell and Rockingham, earthworks at Arbury and elsewhere, Roman remains at Irchester, and monastic ruins at Irthlingborough and Higham Ferrers. There are some remains of Rockingham, Whittlebury, and Salcey Forests. Pop. 361,313.

LITERARY ASSOCIATIONS. Thomas Fuller was born at Aldwinkle St. Peters and there received his early education; while at the neighbouring Aldwinkle All Saints was born John Dryden. A later poet was John Clare, the peasant-poet, born at Helpston. William Law was born at King's Cliffe, William Paley at Peterborough, John Hervey, the



Northamptonshire. Map of this eastern inland county of England, famous for the manufacture of boots and shoes

author of *Meditations among the Tombs*, at Hardingstone, and James Harington, author of *Oceana*, at Upton. Rockingham Castle was partly described by Charles Dickens as the Chesney Wold of *Bleak House*.

Bibliography. *Victoria History of the Counties of England, Northamptonshire*, W. R. D. Adkins and R. M. Sergeantson, ed. H. A. Doubleday, 1902; *N. in the 20th Century*, W. T. Pike, 1908; *Rural N. under the Commonwealth*, R. Lennard, 1916; *Highways and Byways in N. and Rutland*, H. A. Evans, 1918; *Northamptonshire*, W. Dry, 3rd ed. 1920; *N. and the Soke of Peterborough*, S. H. Beaver, ed. L. D. Stamp, 1944.

Northamptonshire Regiment. Regiment of the British army. Raised in 1741 as the 48th Foot, it saw its first active service in Flanders in 1744, and earned distinction at Tournai and Fontenoy. The regiment was present at Louisburg, 1758, fought under Wolfe at Quebec in 1759, and for its share in the defence of Gibraltar, 1779-83, gained the castle and key on its badge; the sphinx on its colours commemorates its gallantry in Egypt in 1801. Eleven honours



Northamptonshire Regiment badge

were gained in the Peninsular campaigns. After taking part in the Maori war in New Zealand, it fought in the Crimea, and from 1879 to 1881 took part in the campaigns in S. Africa.

In 1881 the 58th Foot was incorporated into the 48th Foot and the regt. given its present designation. Like the 48th, the 58th, raised in 1750, saw its first active service in Canada in 1758, and then moved to the W.

Indies, gaining the honours Martinique, 1762 and 1794. It spent many years in garrison in India, and in the S. African War won a V.C. at Laings Nek. Thirteen battalions were raised in the First Great War, and earned the following honours: Mons; Marne, 1914; Aisne, 1914, '18; Ypres, 1914, '17; Neuve Chapelle; Loos; Somme, 1916, '18; Arras, 1917, '18; Epéhy; and Gaza. In the Second Great War, battalions of the regt. fought in Burma, Italy, and Madagascar, and in the liberation of Europe. The regimental depot is at Northampton.

Northanger Abbey. Novel by Jane Austen. It was first published posthumously in 1818,

though it had been completed in 1803. Notable for its entertaining descriptions of social life at Bath, and its easy dialogue, the story was designed as a skit on the romantic "Gothic" fiction of the day.

North Atlantic Treaty. See N.V. section, at end of Vol. 10.

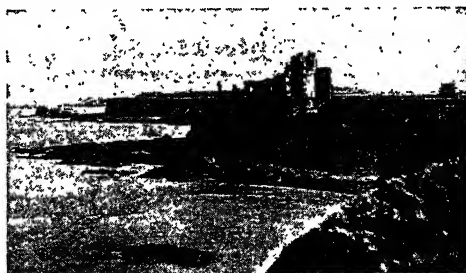
North Bay. Town of Ontario, Canada. The capital of the Nipissing district, it stands on the N.E. side of Lake Nipissing. It is served by the main line of the C.P.R. and the C.N.R., and is a terminus of the Temiskaming and Northern Ontario rly. Pop. 16,500.

North Berwick. Royal burgh and watering-place of East Lothian, Scotland. It stands at the entrance



North Berwick arms

to the Firth of Forth, 23 m. by rly. from Edinburgh. With fine sands, it is famous for its golf courses. Behind the town is Berwick Law, a conical hill, 610 ft. high, and near by are the Bass Rock, Tantallon Castle and Dirlton Castle. North Berwick was made a royal burgh about 1400, and was at that time flourishing as a port. Pop. 4,083.



North Berwick, East Lothian. Ruins of Tantallon Castle, formerly a stronghold of the Douglas family

Firth

Northbrook. THOMAS GEORGE BARING, 1st EARL OF (1826-1904). British politician. Born Jan. 22, 1826, he was the eldest son of Sir Francis Baring, who, in 1866, was created Baron Northbrook. Educated at Christ Church, Oxford, he entered parliament in 1857 as a Liberal for Penryn and Falmouth, and the same year was made a lord of the admiralty. In 1866 he succeeded to the peerage. Northbrook



Thomas Baring, 1st Earl of Northbrook

Stereoscopic Co.

was under-secretary for war 1868-72, and during 1872-76 viceroy of India. In 1876 he was made an earl, and during 1880-85 he was first lord of the admiralty. In 1885 he parted from Gladstone, being opposed to Home Rule. He died Nov. 15, 1904. *See Baring; consult also Memoir, B. Mallet, 1908.*

North Cape. Promontory on Magerö Island, N. Norway. Generally accepted as the northernmost point of Europe, its lat. is $71^{\circ} 10' 40''$ N. The most northerly continental point is Nordkyn. It reaches an elevation of 968 ft.

North Carolina. An Atlantic state of the U.S.A., one of the 13 original states of the Union. Its area of 52,712 sq. m. is a little more than that of England. The W. portion, traversed by the Appalachian system, contains many summits above 6,000 ft., a number of which are forest-clad; they are geologically the oldest mts. on the N. American continent. Mt. Mitchell, 6,711 ft., is the highest peak E. of the Mississippi. On the border of Tennessee is the Great Smoky Mt. park. In the centre the surface is undulating, and the coast region is low and often swampy.

The mainland is separated by Pamlico, Albemarle, and Currituck Sounds, and numerous lagoons and inlets form a chain of long and narrow sandy islands or beaches, which throw out three prominent capes, Fear, Lookout, and Hatteras; between these projections lie Onslow and Raleigh Bays. The principal rivers, all flowing to the E., are the Roanoke, Catawba, French Broad, Neuse, Cape Fear, and Great Pedee.

The state grows 70 p.c. of the valuable bright-leaf cigarette tobacco in the U.S.A. It ranks third for value of farm crops, producing cotton and cotton seed, maize, peanuts, sweet potatoes, and peaches. It is the nation's chief source of mica, feldspar, and residual kaolin clay. There are 200,000 acres of virgin hardwoods. Manufactures include cotton and knitted goods, lumber products, tar, resin, flour. Shad and oyster fisheries are important.

There are 17 institutions of higher learning, including the oldest state university in the U.S.A., at Chapel Hill (1795). Two senators and 12 representatives are returned to congress. Raleigh is the capital. Roanoke Island was the site of the first English colony in America, 1585. Pop. 3,571,623, of whom 981,298 are negroes.

Northcliffe, ALFRED CHARLES WILLIAM HARMSWORTH, VISCOUNT (1865-1922). British newspaper

proprietor and pioneer of modern journalism. He was born at Chapelizod, Dublin, July 15, 1865, eldest of seven sons of a barrister-at-law, and was educated at Hampstead. In 1881 he began to practise with success as a free-lance journalist, and at the age of 17



Lord Northcliffe, British newspaper proprietor

was appointed assistant editor of Youth. Moving to Coventry in 1885, he worked for Iliffe & Sons. In 1887, declining the offer of a partnership, he returned to London, where in 1888 he established the weekly journal Answers, forerunner of many other successful periodicals which developed into the gigantic business of The Amalgamated Press (*q.v.*). In 1894 he and his brother Harold, later Viscount Rothermere (*q.v.*), acquired the London Evening News. In the same year he financed the Jackson-Harmsworth Arctic expedition (*see Arctic Exploration*).

Probably the greatest step in his career was the founding of the Daily Mail (*q.v.*), the first number of which appeared May 4, 1896. The bold original lines on which this, the first halfpenny morning newspaper, was organized quickly revolutionised British journalism, over which Harmsworth's influence was vigorously felt during the rest of his life. In 1903 he founded the Daily Mirror, disposing of it to his brother in 1914.

Created a baronet 1904, Harmsworth received a barony the following year, becoming Lord Northcliffe. In 1908 he became chief proprietor of The Times. The "Northcliffe press," which now included the Weekly Dispatch and the Overseas Daily Mail, was the medium by which he constantly endeavoured to exert an influence over public affairs, especially in directing the thoughts of his readers to patriotic and imperial causes.

In the first year of the First Great War both The Times and the Daily Mail played a leading part in the controversy over the supply of munitions (*see Munitions*). Northcliffe was singled out by the German press for particular malignity as the incarnation of the British will to win, and a bronze "hate-medal" of him was struck in 1916. In 1917 he served as chairman of the British war mission in the

U.S.A., being made a viscount on his return. Declining the office of air minister, he became in Feb., 1918, director of propaganda in enemy countries, and his work in this capacity undoubtedly contributed greatly to the rapid collapse of Germany and Austria. In 1921 he undertook a world tour, but serious illness necessitated its curtailment, and he returned to London in 1922, dying there Aug. 14, 1922. He had no children, and the title became extinct.

He stood unsuccessfully for parliament in 1895 as a conservative candidate for Portsmouth. *Consult Northcliffe, H. Fyfe, 1930; My Northcliffe Diary, T. Clarke, 1931; With Northcliffe in Fleet Street, Sir J. A. Hammerton, 1932.*

Northcliffe Glacier. Huge ice mass on the coast of Queen Mary Land (*q.v.*), Antarctica, falling into Robinson Bay. It was discovered and named by Sir Douglas Mawson (*q.v.*); Dec. 25, 1912.

Northcote, HENRY STAFFORD NORTHOTE, 1ST BARON (1846-1911). British administrator. Son of the first earl of Iddesleigh, he was born in London, Nov. 18, 1846, and educated at Eton and Merton College, Oxford. Secretary to his father, then chancellor of the exchequer, 1877-80, he was M.P. for Exeter, 1880-99. He was appointed governor of Bombay, 1899, and created a peer in 1900. During 1904-08 Northcote was gov.-gen. of the Commonwealth of Australia. He died Sept. 29, 1911.

Northcote, JAMES (1746-1831). British painter. Born at Plymouth, Oct. 22, 1746, he moved to London, where the help of Reynolds enabled him to study at the R.A. schools. He was elected A.R.A. in 1786, and R.A. in 1787; he published his Life of Sir Joshua Reynolds in 1813, One Hundred Fables, illustrated by himself, in 1828, and A Life of Titian in 1830. He died in London, July 13, 1831.



James Northcote, British painter

North Dakota. North-central state of the U.S.A.; area, 70,655 sq. m. It is bounded N. by Canada, E. by Minnesota, S. by S. Dakota, W. by Montana. The geographical centre of N. America is in Pierce co., 50 m. W. of Devil's Lake. A Peace Garden of 3,000 acres on the border marks the long peace between the U.S.A. and Canada.



North Downs. The view from Reigate Hill, Surrey, looking westward along the chalk ridge
Wulf F. Taylor

The surface is chiefly undulating prairie, relieved in the N. by the Turtle Mts. and S.W. by isolated "buttes." In the E. is the Coteau des Prairies, a plateau from 1,000 ft. to 2,000 ft. high, and between the Missouri and James rivers is the Coteau du Missouri from 2,000 ft. to 2,750 ft. high; W. of the Missouri intrude the Bad Lands, areas virtually devoid of vegetation, which are now accessible over all-weather highways. The Red River of the North, tracing the "Sioux state's" E. frontier with Minnesota, has a fertile valley forming part of the nation's N.W. granary. The state leads in the production of spring and durum wheat, rye, flax seed, oats, barley, and maize, and does much cattle rearing and dairy farming. In the W. are 32,000 sq. m. of lignite annually producing 2,000,000 tons. Chief educational centres include the university of N. Dakota Agricultural College, and Jamestown College. The capital is Bismarck. Settled c. 1800, it was part of Dakota Territory, formed in 1861, but joined the union as a separate state, Nov. 2, 1889. Two senators and two representatives-at-large are returned to congress. Pop. 641,935. Consult History of N. Dakota, L. F. Crawford, 1931.

North Devon. Island of British N. America, better known as Devon (*q.v.*).

North Downs. Range of broad chalk ridges which traverses the counties of Surrey and Kent, England, from W. to E. and extends 95 m. from Farnham to the English Channel between Dover and Folkestone. The hills are breached by deep gaps, and separate the London Basin (*q.v.*) from the Kent and Sussex wealds. The western end is a narrow ridge, the Hog's

Back, alt. 489 ft. and a quarter of a mile broad at the top. The Wey, flowing S. of the Hog's Back, breaches the Downs at the Guildford gap. Leith Hill, 965 ft., marks the highest point of the range, and a height of 868 ft. is reached E. of Caterham. Box Hill, 569 ft. above Dorking, is a well-known beauty spot. The ridges are followed in several places by the Pilgrims' Way, traditional route of pilgrims from Winchester to Canterbury.

NORTHERN IRELAND: PART OF THE U.K.

Hugh Shearman Ph.D., author of several books on N Ireland

The physical features, industry, and history since 1920 of the N.E. corner of Ireland are here described. For the earlier history of this region see Ireland. See also Eire; articles on Belfast, Londonderry, and other towns: and the colour map facing p. 4564

Northern Ireland is part of the U.K. of Great Britain and Northern Ireland. It is frequently called Ulster, an ancient name applied to a prov. in the N. of Ireland which was at different historical periods rather larger or smaller than the present Northern Ireland.

Northern Ireland consists of the cos. of Antrim, Armagh, Down, Fermanagh, Londonderry, and Tyrone, and the co. bors. of Belfast and Londonderry. It has a total land area of 5,238 sq. m., roughly one-sixth of the whole island of Ireland, and includes much beautiful hill country, glens, and valleys. There is also a considerable area of inland water, including Lough Neagh, the largest lake in the British Isles, drained by the Bann, Northern Ireland's longest river; and the beautiful lake district of Upper and Lower Lough Erne in co. Fermanagh. On the N. and E., Northern Ireland has a seaboard of 245 m., including some splendid strands and lines of lofty cliffs, and is bounded by the Atlantic

North-Eastern Provinces. The official name for the nine provinces of China usually known as Manchuria (*q.v.*).

North-East Passage. Name of a route round the N. of Eurasia to China (Cathay). Attempts to make it, undertaken mainly by Englishmen and Dutchmen, Wiloughby and Chancellor, 1553, and Barents, the Dutch navigator, 1594-95, failed in their main purpose, but succeeded in opening up a trade with Russia in furs, oil, etc. The North-East Passage was eventually accomplished in 1878-79 by N. A. E. Nordenskiöld (*q.v.*). Since 1932, a number of Russian expeditions have made the N.E. passage, and it has now been developed by the U.S.S.R. as a commercial route. See Arctic Exploration.

Norther. Name for the bitterly cold, often snow-filled, N. and N.W. winter winds experienced in Texas and the Gulf of Mexico region. They are caused by the movement of air from an intense anticyclone towards the rear of a vigorous depression over the W. Caribbean Sea, their strength being due to the marked progressive gradients. The norther sometimes results in temperatures falling 30° F. in an hour.

ocean, the North channel, and the Irish sea. There are several large estuaries and tidal inlets along the coast, the Foyle, Larne Lough, Belfast Lough, Strangford Lough, and Carlingford Lough. On the S. and W. there is a land frontier of 200 m. with Eire.

The pop. in Jan., 1947, was 1,348,000. The average density of pop. was 257 to the sq. m. More than half the pop. of Northern Ireland lives in urban areas, a third being in the Belfast area. Northern Ireland has, over many years, had the highest birth rate in the British Isles.

The capital of Northern Ireland is Belfast; with about half a million inhabitants. It is the seat of the government of Northern Ireland. The next largest centre of pop. is Londonderry, with 49,000. Next in size is the popular seaside resort of Bangor, in co. Down, with 20,000. Other towns of over 10,000 are, in order of size, Lurgan, Lisburn, Ballymena, Portadown, and Newry, all inland

market and industrial towns, Larne, a port town, and Newtownards. Other still smaller towns, however, have an important place in the life of the prov. and include the historic little cathedral city of Armagh, the ancient port of Carrickfergus on Belfast Lough, Coleraine, a river port on the Bann, Enniskillen and Omagh, the co. towns of Fermanagh and Tyrone, and the seaside resorts of Portrush, Donaghadee, Portstewart, and Newcastle.

Belfast is the main transport junction of the prov. and the principal port. Thus, of 11,043 vessels arriving in Northern Ireland in 1945, 8,940 arrived at Belfast harbour or the small adjacent ports of Belfast Lough. Belfast is linked by passenger steamship services to Heysham, Liverpool, and Glasgow. There is also a regular passenger service between Larne and Stranraer in Scotland. Londonderry, too, is a port of importance. There is an airport at Nutti's Corner, co. Antrim, several miles from Belfast, and a smaller airport beside Belfast harbour. There is no customs barrier between Northern Ireland and the rest of the U.K., but there is one between Northern Ireland and Eire.

Internal Transport

Much of the internal traffic is by road, several light rlys. having been superseded by road transport. Most of the road transport services are nationalised and are operated by the Ulster transport authority, set up in 1948. Public transport in Belfast, however, is under the city corporation, and private carrying firms are allowed in Belfast and Londonderry. Motor hackney carriages and transport for particular trades also remain in private control.

There are three main rly. systems, also controlled by the Ulster transport authority. The Northern cos. line of the former L.M.S. system serves the cos. of Antrim and Londonderry and a part of Tyrone. The Great Northern line serves all the cos. to some extent. Its main line goes S. from Belfast to Portadown, where one main line branches E. and serves Armagh, Tyrone, Fermanagh, and Londonderry; another goes S. across the frontier to Dublin. The Belfast and co. Down line serves N. and E. Down. The parliament of Northern Ireland, which placed the rlys. and roads of the prov. under the control of the Ulster transport authority, purchased the Belfast and co. Down rly. in 1948. Of six

inland waterways in use, the Lower Bann navigation is controlled by the ministry of finance and the rest remain under the control of private companies. They do not carry much traffic.

CONSTITUTION AND ADMINISTRATION. The Government of Ireland Act, 1920, of the U.K. parliament set up two legislatures in Ireland, one of them in Belfast for Northern Ireland, to which was delegated control over certain local matters. At the same time, Northern Ireland had a federal status within the U.K., electing 13 members to the house of commons at Westminster. Various amending acts have not altered the fundamental principles of that settlement. The frontiers of Northern Ireland were guaranteed by a tripartite agreement made in 1925 between the govts. of the U.K., the Irish Free State, and Northern Ireland. A considerable part of the public affairs and public services is under the direct control of the U.K. parliament, and the local parliament of Northern Ireland may not legislate with regard to them. Subjects thus reserved include: the crown and the succession, peace, war or neutrality, the armed services, relations with foreign powers or with other parts of the British Commonwealth, titles of honour, treason, extradition of fugitive offenders, naturalisation, aliens, foreign trade, navigation by sea or air, the post office, submarine cables, radio, lighthouses, coinage, weights and measures, trade marks, copyright, and patents. In these and other respects, Northern Ireland has exactly the same status as England, Wales, or Scotland.

Parliament and Finance

The parliament of Northern Ireland consists of a house of commons of 52 members elected by universal adult franchise, and a senate or upper house of 24 members elected by the house of commons, together with two ex officio members, the lord mayor of Belfast and the mayor of Londonderry. The house of commons has a maximum life of five years; an elected senator holds office for eight years. There is a prime minister of Northern Ireland, and ministries have been established dealing with finance, home affairs, labour, education, agriculture, commerce, public security, and health and local government. The head of the govt. and representative of the king is the governor. He summons, prorogues, and dissolves the parliament and gives assent in the name of the king to its legislation

Broadly speaking, the taxation of Northern Ireland is the same as that in other parts of the U.K. Taxation revenue of the prov. goes into the U.K. exchequer, and the imperial contribution is retained by it to pay for Northern Ireland's share of general national expenditure. Then a sum, c. £9,000,000, is handed back to the N.I. govt. to pay for those services delegated to it. The sum thus handed back is decided each year, by a joint exchequer board consisting of a chairman appointed by the crown and a representative each from the U.K. Treasury and the Northern Ireland ministry of Finance, on the principle that Northern Ireland shall have equality in social services with other parts of the U.K. and a position of relative equality in all other services, taking into account local conditions. The imperial contribution in the first 25 yrs. of the existence of the govt. of Northern Ireland was c. £250,000,000. The U.K. exchequer also deducts from Northern Ireland taxation about £3,000,000 a year, the cost of certain administrative expenses, loan charges, etc.; and the govt. of Northern Ireland may impose a small range of taxes, e.g. death duties, stamp duties, motor vehicle duties, and entertainments duty.

Local Government

There are five main types of local govt. authority, all elected: the corporations of the two co. bors. of Belfast and Londonderry; the bor. councils of the various towns which have been given bor. status, such as Ballymena, Bangor, Coleraine, Larne, and Newtownards; the urban dist. councils serving other towns; the six C.C.s; and more than 30 rural dist. councils. Other public bodies, e.g. water and harbour commissioners, fulfil special functions. Local govt. bodies work under the general supervision of the ministry of Health and Local Government. The annual expenditure of local govt. bodies is more than £12,000,000, about a quarter from rates, another quarter from govt. grants, the remainder earned by public utility depts., transport, housing, etc. Capital indebtedness of local govt. bodies is c. £20,000,000. Northern Ireland has its own judicial system, modelled on the English pattern, with an ultimate appeal to the house of lords. The petty sessions courts are presided over by paid professional resident magistrates sitting alone; the judicial powers of J.P.s have been abolished

RELIGION AND EDUCATION. One third of the pop. is R.C. Among the Protestants the largest denomination is Presbyterian, the second largest church of Ireland, a Protestant episcopal body in the Anglican communion. Schools are run by local govt. bodies, and by private and religious bodies, under the supervision of the ministry of Education; attendance at a place of education is to be compulsory up to 16. The ministry has its own training college for elementary teachers. Belfast is the seat of Queen's University; Londonderry has an arts school at Magee College, where students are prepared for the examinations of Trinity College, Dublin. There are many technical schools throughout the province; and a number of organizations encourage cultural interests and activities.

INDUSTRY AND TRADE. Farming is the largest industry, providing before 1939 about a third of Northern Ireland's total exports. Manufactured exports increased during the Second Great War, but the produce of the land remained a large part of the total. There are over 90,000 agricultural holdings larger than one acre, 70 p.c. of the agricultural area being farms of 15 to 100 acres. Mixed farming is usual, and much of the crops grown is used to feed livestock and poultry. Chief crops are oats and potatoes, with smaller areas of roots and kale, flax and seed hay. Fruit farming is carried on, particularly in co. Armagh; canned foods and milk products are exported. Most important agricultural exports are fat and store cattle, fat lambs, bacon, eggs, butter, grass seed, seed potatoes, and apples. From 1924 the ministry of Agriculture has enforced a sound system of collection, marketing, grading, packing, and inspection. The ministry has also done much to extend agricultural education. Mechanisation has made rapid progress even on very small farms.

Fisheries are carried on, for eel and pollan on Lough Neagh and for salmon on the N. coast. White fish is landed at Portavogie, Kilkeel, and Annalong in co. Down, and a herring fleet operates from Ardglass, also in Down.

Ulster linen is one of the most important exports of the U.K. as a whole. Other textile manufactures are cotton and rayon. There is a considerable clothing industry. At Belfast there is a large ship-building industry; and a great succession of record-breaking liners,

warships, and vessels of every kind has earned Belfast shipyards a world-wide reputation. Much marine engineering and repair work is done. There is large scale manufacture of ropes and cables, foundry work, and the making of small mechanical devices and equipment. Aircraft, paper, whisky, jam, soap, boots and shoes, furniture, artificial limbs, metal boxes, and plastics are other types of goods made.

In 1946 Northern Ireland's exports amounted to £127,666,000, nearly £100 per head of the pop., while imports were £125,141,000. Exports of food and drink were £17,015,000; articles wholly or mainly manufactured £63,427,000; tobacco, ropes, aircraft, ships, and shipping repair work £34,878,000; livestock £8,445,000.

HISTORY. The govt. of Northern Ireland, led by Sir James Craig (later Viscount Craigavon), was established in 1920; its depts. were set up and powers handed over during 1921. Northern Ireland suffered as the result of the stormy conditions under which the Irish Free State was established in 1922. When a civil war broke out in the Free State in 1922, it overflowed into Northern Ireland, and the prov. was disturbed by many episodes of bomb throwing, shooting, and incendiarism. These troubles died down, but they left a legacy of bitterness.

The Unionist govt. of Sir James Craig remained in office until his death in 1940. The Unionist party (in favour of the union with Britain) continued to have strong majorities at all general elections. Lord Craigavon was succeeded as prime minister by J. M. Andrews, and he in turn in 1942 by Sir Basil Brooke, Bt. As those who support the union do not necessarily agree on other subjects, groups and movements inside the Unionist party had much importance. The policy of the govt. might be described as a progressive conservative policy, going somewhat "left" of English Conservatives in its application of principles of public control to many undertakings, but repudiating any specific Socialist doctrine. The parl. opposition has consisted of several groups of Irish nationalists and three competing labour parties.

The economic depression from 1930 afflicted Northern Ireland with particular severity on account of the province's dependence upon export trade. But with the outbreak of war in 1939, Northern Ireland came to have increasing

importance, particularly in view of Eire's neutrality. Northern Ireland contributed many able men and women to the forces, among them officers of high rank, e.g. Sir John Dill, Lord Alanbrooke, Lord Alexander, and Sir Claude Auchinleck. Her agricultural and industrial capacities were of major importance. The farmers of Northern Ireland made a large proportionate contribution to the home-produced food supply than the agriculturists of any other part of the British Isles. The Belfast shipyards contributed 140 warships and 10 p.c. of the whole merchant shipping tonnage built in the British Isles. There was a large output of tanks, guns, and ammunition, aircraft, including 1,500 heavy bombers, accessories, including some 2,000,000 parachutes and a third of the ropes produced in the U.K. for the War office. The textile industry produced 90 p.c. of the shirts used by the British forces. Northern Ireland was also of very great strategic importance, providing vital bases from which the Atlantic could be patrolled, and it received the first U.S. troops sent to train in the U.K. for the invasion of Europe. During the Second Great War the Ulster cabinet became a coalition of Unionist, Labour Unionist, and Commonwealth Labour members. The general election of 1945 again gave the Unionists a strong majority.

NORTHERN IRELAND TALENT. The community which inhabits Northern Ireland is chiefly English and lowland Scot in its tradition and ancestry. Few areas in the world have produced so many talented men and women proportionately. Besides field marshals, Northern Ireland has produced administrators such as Sir Robert Hart, scientists such as Lord Kelvin, inventors such as J. B. Dunlop, pioneers in medicine such as Sir Robert McCarrison. Skill and mechanical ability are widely diffused. Northern Ireland artists of note include Lavery, William Conor, and Paul Henry; among writers are Forrest Reid, Robert Lynd, St. John Ervine, and Louis MacNeice. Belfast is increasingly a cultural centre.

Bibliography. Ministry of Finance (N.I.), *Ulster Yearbook* (H.M.S.O.), as published; *The Revolution in Ireland*, W. A. Philipps, 2nd ed., 1926; *History of Northern Ireland*, D. A. Chart, 1927; *Government of Northern Ireland*, N. Mansergh, 1936; *In Praise of Ulster*, P. Hayward, 1938; *Not an Inch: Study of Northern Ireland and*

Lord Craigavon, H. Shearman, 1942; Northern Ireland, H. Shearman (H.M.S.O.), 1946; Constitution of Northern Ireland, 3 vols., A. S. Quekett (H.M.S.O.), 1928-47.

Northern Lights. Name popularly given to the phenomenon of the Aurora Borealis (*q.v.*).

Northern Line. London railway. The first section was opened in 1890 as the City and S. London tube, and ran from King William Street to Stockwell, a distance of $3\frac{1}{4}$ m. It was subsequently joined to the Hampstead and Highgate tube rly., and extended in both directions, and by 1941 had N. termini at High Barnet and Edgware and S. terminus at Morden, a distance of $40\frac{1}{2}$ m., most of which is underground. Taken over with the other underground railways by the London Passenger Transport Board in 1933, it was nationalised in 1948 and operated by the London Transport Executive.

Northern Rhodesia. British protectorate in S. Africa. It lies between long. 22° and 33° E. and between lat. $8^{\circ}15'$ and 18° S. It is completely surrounded by neighbouring territories, Angola, Belgian Congo, Tanganyika, Mozambique, Southern Rhodesia, and South-West Africa. It has an est. area of 290,320 sq. m., consisting for the most part of a vast tableland 3,000-5,000 ft. in height. Around the Zambesi R., which forms the greater part of the southern boundary, there is magnificent scenery, including the Victoria Falls, one of the natural wonders of the world. The country has luxuriant forests and is well watered owing to the vast swamps.

The European pop. (1946) is close on 22,000; est. African pop. 1,400,000; Asiatic pop., mostly British Indians, about 1,100. The Europeans are settled mostly near the rly. running from Southern Rhodesia to the Belgian Congo via the Victoria Falls, or in the copper belt in the neighbourhood of the Belgian Congo.

It was not until 1851, when Livingstone began his great missionary journeys, that authentic information was obtained about this territory. Before 1899 it was included in the charter of the British South Africa Co. In 1924 the British government assumed control and appointed a governor, assisted by an executive council (officials only) and a legislative council (partly elected non-officials).

In its earlier stages the territory was mainly agricultural, the chief products being maize, live-

stock, and tobacco, but rich copper deposits have been discovered and developed into an extensive industrial area employing many Europeans and natives, and it is now one of the world's chief copper-producing areas. Other minerals developed include zinc, which ranks next to copper in importance. Consult An African Survey, Lord Hailey, 1938. For map, see Southern Rhodesia.

Northern Territories. A British protectorate of W. Africa, attached to Gold Coast colony. It is bounded N. and W. by Ivory Coast, E. by Togoland, and S. by Ashanti. Placed under British protection in 1901, it is peopled by Muslim Hausas and negroes, engaged in agriculture and stock rearing. The cap. and chief tn. is Tamale. Area 30,486 sq. m.; pop. (1948) 1,077,138.

Northern Territory. Part of Australia directly administered by the Commonwealth itself. It lies between meridians 129° and 138° E., N. of 26° S., with a coast-line on the Arafura Sea and the Gulf of Carpentaria. From 1863 it formed the N. part of South Australia, and with this status joined the Commonwealth in 1900, but in 1911 it passed under the control of the central authority. The S. comprises a highland area, Macdonnell Ranges, part of the Central Australian desert, although water is found in the valleys and can be reached by artesian bores; northwards lies the plateau with extensive pastoral areas suitable for cattle runs.

The people live mainly in the N. Gold, copper, tin, and wolfram are mined. Darwin is the chief port, and the terminus of the overland telegraph and of the N. section of the Transcontinental Rly. Area 523,620 sq. m. Pop. 20,000 (14,500 aborigines). From 1927 to 1931 the territory was divided into North Australia, with 287,220 sq. m., and Central Australia, with 236,400. Newcastle Waters is the capital of North and Alice Springs of Central Australia. Consult N. Australia, C. P. Conigrave, 1936.

Northern Union. The professional British Rugby football organization from 1895 to 1922, renamed Rugby League in the latter year. See Football.

Northfield. Dist. of Worcestershire, England, now a suburb of Birmingham. It has a rly. station, and the principal industries are the manufacture of nails and other forms of hardware. Pop. 46,000.

Northfleet. Urban dist. of Kent, England, adjoining Gravesend. It is on the Thames, 22 m.

from London, with a rly. station. The church of S. Botolph is a fine building, partly Perpendicular. The industries include the manufacture of cement, paper, and chemicals. Pop. 18,785.

North Foreland. Headland of Kent, England. Off here three actions were fought in the wars with Holland. The first battle opened June 2, 1653, with an attack by the English admirals, Monk, Deane, and Lawson, on the Dutch fleet of Tromp. With the arrival of Blake on the following morning the Dutch made a hasty retreat, having lost heavily.

The second battle was begun June 1, 1666, by Monk's attack on the Dutch under de Ruyter, and lasted for four days. On the 2nd the battle opened early, and went against the English. The next morning Prince Rupert hastened to Monk's assistance, but after heavy fighting on the 3rd and 4th, the English were obliged to make the Thames, having lost 20 vessels and 6,000 men. A third battle, fought July 25 and 26, 1666, resulted in the flight of the Dutch. See Foreland, N. and S.

North German Confederation. Alliance formed in 1866 by 22 sovereign German states. The German Confederation of 1815 was broken up by Prussia's attack on her fellow-member Austria in 1866. After the defeat of Austria, a new alliance, the North German Confederation, was formed, Aug. 18, 1866, consisting of Prussia and the remaining states of the old Bñd N. of the Main, except Luxemburg, which was divided between Holland and Belgium. On April 16, 1867, a constituent assembly ratified the constitution, which was proclaimed on July 1. The Bund had an area of 160,000 sq. m. and a pop. of 30,000,000. See Bismarck; Bund; Germany; Prussia.

North Holland. Province of the Netherlands, described under Holland.

North Island. The smaller and more northerly of the two main islands of the dominion of New Zealand. It has a lat. corresponding to that of S. Spain, a more equable temperature and more evenly distributed rainfall than S. Island, and is more definitely suited to the pastoral industry. The E. and S.E. contain probably the finest sheep country in the world, and the S.W. is ideal for dairy cattle. The N. is steadily developing a fruit industry. North Island comprises four provincial districts: Auckland, Hawke's Bay,

Wellington, and Taranaki; and contains in Auckland and Wellington the two largest cities of the dominion. Rlys. connect Wellington with Auckland, Napier, and New Plymouth. Area, 44,280 sq. m. Pop. 1,146,292. See New Zealand.

Northmen. Name given to Scandinavian sea-rovers who began their incursions upon the coasts of W. Europe late in the 8th century. The names Northmen and Viking cover four groups: the Swedes and the Goths, who confined their attentions mainly to the Baltic shores; the Danes from Jutland and Slesvig; and the Norsemen from Norway; though both Danes and Norsemen were names sometimes applied to the whole. In England, the name of Ostmen, the men from the East, was sometimes applied.

The first recorded raids on English, Irish, and French soil respectively are dated in 787, 795, and 799. In the first instance the raids of the Northmen were mere landings in search of booty by pirate crews composed of free warriors who followed some captain of repute. During the early part of the 9th century they were still for the most part ravaging in small bands. Then the small bands began to grow into confederate fleets, Danes and Norsemen acting together.

In the second half of the 9th century supreme kings were establishing themselves in both Denmark and Norway; and this process encouraged minor chiefs to seek other lands and to settle. Danish hosts established themselves in England and made themselves masters of the whole district known as the Danelagh; though Alfred drove them out of Wessex, and in the next century his son and grandson forced them to own the overlordship of the king of England. In France the Viking hosts met with a check when they laid siege to Paris in 885.

After the permanent establishment of the Danelagh in England, and the dukedom of Normandy in France in 912, raiding France and England ceased to be a profitable employment for Danes and Norsemen, though the latter acquired a supremacy in the extreme N. of Scotland, over the islands of the Hebrides, and on the E. coast of Ireland, until their efforts at further conquest in Ireland were finally checked by a crushing defeat at Clontarf at the hands of Brian Boru in 1014. In the days of Ethelred II, at the close of the 10th century, Danish and Norse raids upon England revived; but

the Danish leader Sweyn became king first of Denmark, and then in 1013 of England as well, and in the reign of Canute Denmark finally lost the characteristics of a pirate state. See Danelagh; England: History; Goths; Norman; Norse; Russia; Viking.

Northolt. Village of Middlesex, England. It is 2½ m. S.S.W. of Harrow. The aerodrome, a terminus for flights to Europe, was used by the R.A.F. as a fighter station in the battle of Britain. In 1946 the adjacent racecourse was acquired as a housing site.

North Pole. Lat. 90° N., one terminus of the earth's axis. The pole itself is the central point of the shallow Arctic basin wherein lies the Arctic Ocean. The geographical N. pole must not be confused with the N. magnetic pole which is (1950) some 1,000 m. distant, i.e. approx. 74° N., 100° W. See Arctic Exploration.

North Rhine-Westphalia. A Land of W. Germany, in the British zone of occupation, formed 1946 from the N. half of the former Rhine (q.v.) prov. and the former Westphalia (q.v.) prov. In 1949, 10 p.c. (1,200,000) of its pop. were refugees and expelled persons.

North Riding. One of the three administrative divisions (A.S. *thriding*, third part) of Yorkshire, England, and for many purposes a co. of itself, with its own admin. centre, Northallerton. The North Riding is mainly agricultural, but there are rich iron deposits in the Cleveland district. Middlesbrough is the largest place, Scarborough and Whitby are seaside resorts, and other towns are Pickering, Malton, Thirsk, Richmond, Hawes, and Bowes. The Derwent marks the boundary with the E. Riding, and the Ure part of that with the W. Riding. In the extreme W. the fells rise over 2,300 ft. Area, 2,128 sq. m. Pop. 469,375. See Yorkshire.

Northrop, JOHN HOWARD (b. 1891). American biochemist and biologist. Born in New York, July 5, 1891, he was educated at Columbia university and in 1915 was appointed an assistant at the Rockefeller Institute for Medical Research. He was in the U.S. chemical warfare department in the First Great War, and later held various research posts, becoming a lecturer at Johns Hopkins university in 1940. In the Second Great War he was a consultant to the national defence research committee. For his researches into the purified production of enzymes and virus proteins he shared with Prof. W.

M. Stanley (q.v.) half the 1946 Nobel prize for chemistry. In 1939 he published *Crystalline Enzymes*.

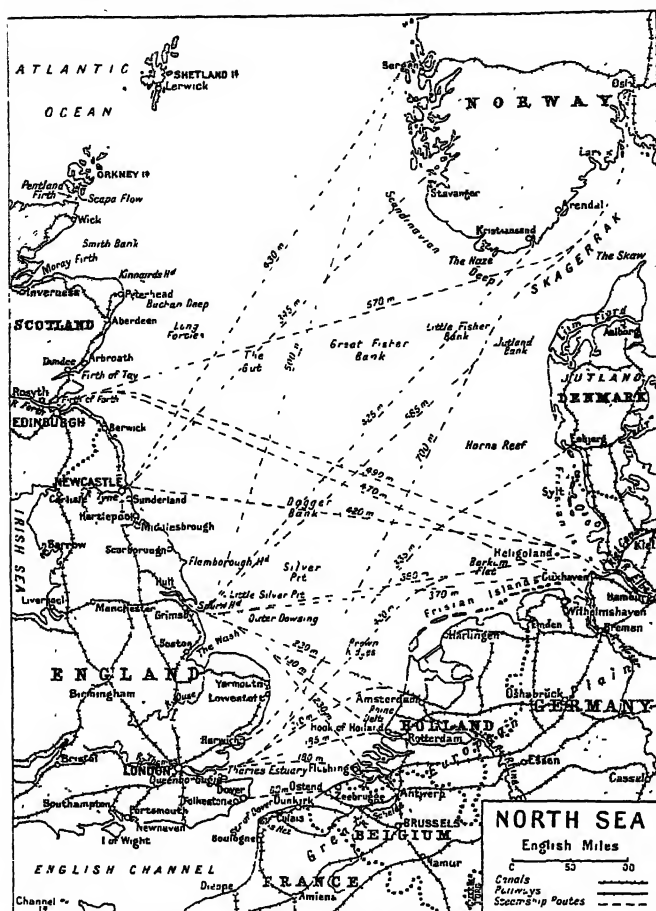
North Sea. Arm of the Atlantic Ocean, and the most easterly of the British seas. It covers part of the continental shelf of W. Europe, and except for the Scandinavian deep, over 2,400 ft., off the S. of Norway, it is relatively shallow, with an average depth of 120 ft. in the S. and 350 ft. in the N.

This sea being physically a connexion between the lowlands of E. Britain and the great European plain, its coast-line is not a permanent feature; the former Zuyder Zee was an accidental enlargement, and English coastal areas are being slowly removed, while the great rivers tend to fill it with their loads of sediment, so that the Rhine delta and the Thames estuary experience encroachments of the land on the sea. Structurally the North Sea is part of the lowland between the old mountains of Scandinavia and Scotland and the middle-aged mountains of S. England, Belgium, and N. Germany. The S. outlet by the Strait of Dover is not inherent to the structure, and occurred in a comparatively recent geological epoch. Between these ranges the rivers form one system which, in the days before the area was drowned, when the plains were connected by dry land, may have all—Thames, Ouse, Lower Rhine, Elbe, etc.—joined to make one great N.-flowing river.

The submarine surface is marked by inequalities; the Dogger, Jutland, and Great Fisher banks are submarine ridges, the Silver and other pits are submarine hollows. The waters slowly circulate, a S.-flowing current along the British coast becoming a N.-flowing current on the Eastern shore; the tides are unusually complicated; they enter by the Strait of Dover and round Scotland, flowing S. along the British coast and N. along the E. shore, scouring the great estuaries on both sides.

Owing to these movements the floating eggs of the food fishes are widely distributed, and the shoals of fish, such as the herring, appear to follow regular movements which control the work of the trawlers. These fish feed on the large quantities of the lower forms of animal and vegetable life in which the North Sea abounds, and thus this marine area is one of the chief of the world's fisheries.

Commercially the North Sea is the most important water area in the world, and historically, with



North Sea. Chart showing the fishing banks and steamship routes between Great Britain and the principal Continental North Sea ports

the English Channel, it is a predominant physical feature of W. Europe. Its area is 190,000 sq. m.; maximum breadth 420 m., and length 700 m.

From the earliest times Great Britain's security has depended upon her control of the North Sea, without which she would be open to invasion. It was across the North Sea that the Vikings sailed, and the same route was taken by the Saxon invaders. It was not until Alfred the Great established English naval power that the coasts of Great Britain became comparatively secure.

By the beginning of the 15th century England had gained virtual control of the North Sea, which became the route for trade with the Low Countries. The only interference was from the attacks of pirates. English security in the North Sea was due greatly to the fact that countries with North

Sea coastlines were constantly at war, and, except Holland, none became sufficiently strong to dispute English supremacy. Even the Dutch avoided fighting general naval engagements in the North Sea, and their warlike activities were generally confined to demonstrations or forays. Similarly, the French and Spanish fleets avoided the North Sea, where Great Britain was always in a position to concentrate overwhelming naval strength; moreover, in order to reach the North Sea, Spanish or French ships had to pass through the English Channel. The only hostile Spanish warships which entered the North Sea were the storm-battered remnants of the defeated Armada in 1588.

On the other hand, the North Sea was open to British warships and transports taking troops to the Continent, and it was command of the North Sea that made

it possible to maintain large continental British armies in the 16th, 17th, and 18th centuries. When these armies met with disaster it was always after they had landed, and was never due to inability to transport and maintain them by sea.

It was not until the development of the German empire in the last decades of the 19th century that any nation became strong enough to dispute British supremacy in the area. Germany set out to achieve naval parity with Great Britain; these ambitions were openly declared when Kaiser William II rechristened the sea the German Ocean.

North Sea in the Two Wars

Nevertheless, from the outbreak of the First Great War, Great Britain retained virtual control of the North Sea and was able to maintain a strict blockade, and virtually to close its waters to enemy surface vessels. The Royal Navy laid vast minefields to block its approaches; cruisers and destroyers patrolled unopposed; and battle cruisers operated as far afield as the Skagerrak. German warships were unable to patrol even their own coastline, and when they did venture far into the North Sea they met with disaster, as at the Dogger Bank, Jan. 24, 1915. It was only by sailing in the territorial waters of neutrals that they were able to maintain merchant traffic.

In the Second Great War, Germany repeated her 1914-18 policy of keeping her main surface fleet intact. On the other hand, Great Britain was in a less advantageous position than in the First Great War, primarily because she was unable to hem in the enemy with a great minefield. One was laid parallel to the east coast of Great Britain shortly after the outbreak of war in 1939, and this successfully prevented any German warships except shallow-draft E-boats attacking North Sea shipping. With her occupation of the European coast from Norway to Ushant, Germany had innumerable bases for air operations over the North Sea, and throughout most of the war British warships and merchantmen required heavy anti-aircraft protection. Except when a definite object was in view, major units of the Royal Navy used the North Sea little in the early years of the war and most of the British patrolling was confined to cruisers, destroyers, and motor-torpedo boats working in close cooperation with shore-based aircraft. Gradually the Royal

Navy and R.A.F. regained control, and by 1941 were in a position to ensure the safe passage of a number of expeditions against occupied Norway, besides carrying out attacks on supply convoys.

In the summer of 1942 the initiative in the North Sea clearly passed to the Allies. E-boats, no longer offensive, took up the defensive duty of protecting German convoys from attack. From 1943 onwards the British Home Fleet made periodical sweeps right up to the Norwegian coast. Virtually the only damage was by air-laid mines. After the Allied invasion of Europe in June, 1944, operations to check enemy forces coming down from Norway were almost unopposed, while U-boats suffered heavy losses. The clearing of the minefields occupied large fleets of British and German sweepers for nearly a year after hostilities ceased. See *Dogger Bank*; *Jutland*; *Skagerrak*. Consult *The Battle of the Narrow Seas*, P. Scott, 1945.

North Sea Fisheries Convention. Agreement made at The Hague in May, 1882, between Great Britain, Germany, Belgium, Denmark, France, and Holland, with power reserved to Sweden and Norway to come in on giving notice. This convention declared that the fishermen of each country should have the exclusive right of fishing within a distance of 3 m. from low-water mark along the whole extent of their respective countries, as well as of dependent islands and banks. As regards bays and inlets the 3 m. were to be calculated from a line drawn across the bay in the part nearest the entrance where the bay did not exceed 10 m. in width.

Other clauses stated that fishing boats were to be registered, and to bear their registration marks and numbers distinctly marked, and to carry official papers showing their nationality. Minute rules and regulations governed the manner of fishing and the behaviour of fishing boats to each other, e.g. the right to cut entangling lines. The regulations were to be enforced by means of special cruisers having the right of visit, search, and arrest. The arrested boat was to be handed over to its own country to be dealt with and punished.

North Somerset. This island of British N. America is noted as Somerset.

North Staffordshire Regiment. Regiment of the British army. Raised in 1756 as the 64th Foot, the regiment earned its

first battle honour at Guadaloupe and fought in the



North Staffordshire Regiment badge

the Sikh War, the 64th Foot went to the Persian Gulf in 1856 to assist in suppressing piracy, one of the few British units to carry the battle-honours *Reshire*, *Bushire*, and *Koosh-ab*. It fought in the Crimea, and in 1876 was in garrison at Malta, when it received its alternative title, *The Prince of Wales's*, and was granted the prince of Wales plume, which now forms part of its badge.

In 1881 the 64th Foot absorbed the 98th Foot, which had been raised in 1824. The amalgamation is commemorated in the Stafford knot incorporated in the regimental badge. The 98th had distinguished service in the China War, 1840-42, and later fought in the Crimea. The combined regiment served in the Sudan in 1896 and earned much distinction in the S. African war. Seventeen battalions of the regt. were raised in the First Great War, winning six V.C.s and the battle honours *Armentières*, 1914; *Somme*, 1916, '18; *Arras*, 1917; *Messines*, 1917, '18; *Ypres*, 1917, '18; *St. Quentin Canal*; *Sari Bair*; *Kut-el-Amara*, 1917; and *N.W. Frontier*, 1915. The regiment served in France, N. Africa, Italy, and Burma in the Second Great War. The regimental depot is at Lichfield, Staffordshire.

North Star. Another name for the Pole Star (*g.v.*).

Northstead, MANOR OF. The stewardship of this Yorkshire manor is an office of profit under the crown, and acceptance of it will enable an M.P. to resign his seat, which he cannot do directly. See *Chiltern Hundreds*; *Member of Parliament*.

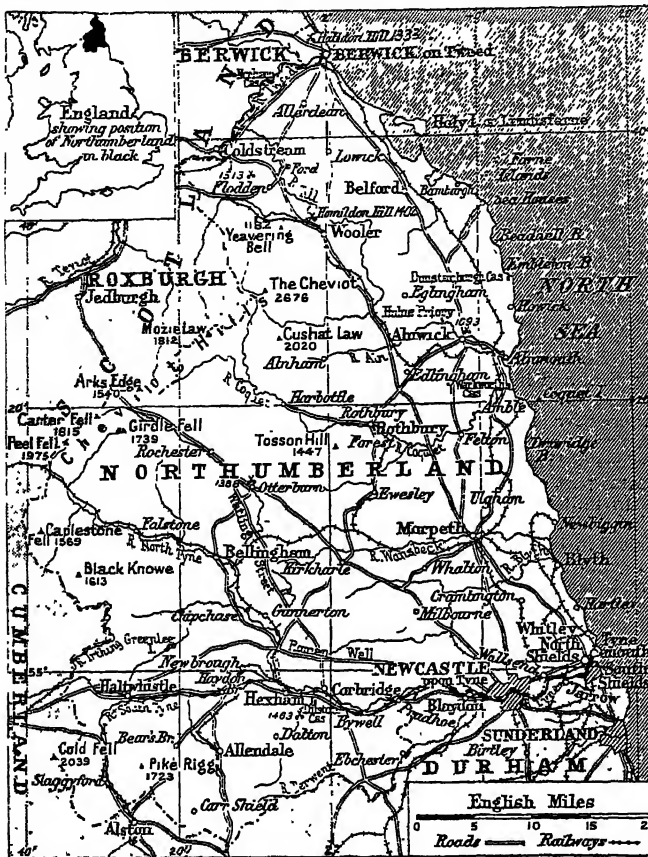
Northumberland. County of England. The most northerly of all, it is separated from Scotland by the Cheviot Hills and the Tweed. Its area is 2,018 sq. m. and it has a long coast-line on the North Sea. From there the surface rises to the Cheviots, the highest point of which is 2,676 ft., and it varies between moorland and verdant undulations, intersected by fertile and wooded valleys. A geological feature is the

Great Whin Sill, a sheet of basalt forming a succession of crags stretching with intervals from the N.E. into Cumberland.

The chief rivers are the Tyne, Tweed, Till, Wansbeck, Aln, and Coquet, and there are several small lakes, Greenlee Lough being the largest. Off the coast are Coquet and Holy Islands, and the Farne Islands. Agriculture flourishes along the coast and in the valley districts, and the rearing of Cheviot sheep and Durham short-horns is actively pursued. There is a coalfield in the S. part of the county, and the urban industries are mainly associated with this. Newcastle-upon-Tyne is a co. of itself, and Alnwick is the co. town; other places are Tyne-mouth, Berwick-on-Tweed, Wallsend, Morpeth, and Hexham. Blyth is a fishing port, and there are several populous urban districts in the mining area. There are 3 co. and 7 bor. constituencies. Northumberland forms the diocese of Newcastle.

In Anglo-Saxon times Northumberland formed part of the kingdom of Bernicia, and then of Northumbria. Its history is dominated by the fact that it was on the border between England and Scotland, and was the scene of centuries of constant warfare. It was protected by fortresses, and herein are Flodden, Otterburn, Homildon Hill, and other battlefields. The county contains also Bamburgh, Lindisfarne, and the castles, now mainly ruins, at Norham, Dilston, Warkworth, Dunstanburgh, Bamburgh, and Prudhoe. Alnwick has been largely rebuilt; Ford and Chipchase are also mainly modern. The Roman Wall passes through the county. Pop. 756,782.

LITERARY ASSOCIATIONS. From its position as a border county Northumberland has rich association with the old ballad literature of the border district. Among these ballads may be named *The Brave Earl Brand*, *Jack and Tom*, *The Baillie of Berwick*, *Sir Arthur and Charming Mollee*. Bamburgh is reputed by some to be the Joyous Gard of Arthurian legend; it is the scene of much prose and verse concerning *Grace Darling*, and of *Bessant's Dorothy Forster*. Much of the action of *Scott's Marmion* takes place in the county (Flodden, Holy Isle, Norham). *Swinburne* wrote of the county. At Warkworth was born the 17th century historian, *John Rushworth*, and the hermitage there afforded the subject of *Bishop*



Northumberland. Map of the north-eastern county of England, famous for its historical associations with the Scottish border

Percy's The Hermit of Warkworth. At Newcastle was born Mark Aken-side. Thomas Bewick came from Cherryburn, near Newcastle.

A history of the co. in 9 vols. was issued by its historical committee, 1893-1909.

Northumberland, DUKE OF. Title held since 1766 by the family of Percy. There was an earl of Northumberland at the time of the Norman Conquest and afterwards, but as an hereditary title it dates from 1377, when Henry Percy, Baron Percy, was made earl. He was killed at Bramham Moor in 1408 and the title was forfeited, but it was restored to his grandson and stayed with his descendants until the 11th earl died in 1670. During 1551-53 there had been a duke of Northumberland, John Dudley (v.f.). From 1683 to 1716 George Fitzroy, a natural son of Charles II, was duke of Northumberland, but he died without sons.

The 11th earl's daughter married Charles Seymour, duke of Somers-

set (1662-1748), and their son Algernon, the 7th duke, was made earl of Northumberland in 1749. He had no sons, and the earldom passed to his son-in-law, Sir Hugh Smithson, who took the name of Percy. In 1766 he was made duke of Northumberland. In 1875, when the 4th duke died, the title passed to a grand-nephew, George, earl of Beverley, and from him the later dukes are descended. Henry George Alan, 9th duke (1912-40), was parliamentary private secretary to the lord privy seal, 1935, and to the secretary for Air, 1936. Killed in action with the B.E.F., May 21, 1940, he was succeeded as 10th duke by his brother, Hugh Algernon (b. April 6, 1914), who became in 1945 a lord in waiting. The duke's chief seat is Alnwick Castle, and he owns Syon House, Brentford, and Albury Park, Guildford. An eldest son is called Earl Percy. See Percy.

Northumberland, JOHN DUDLEY, DUKE OF (c. 1502-53). English soldier and politician.

The attainer of his father, Edmund Dudley (c. 1462-1510), was reversed by Henry VIII, and as Viscount Lisle, John proved himself a soldier and administrator of ability. In 1547 he was made earl of Warwick and defeated the Scots at Pinkie. He became earl marshal and duke of Northumberland in 1551. He sought to consolidate his position by the marriage of his son Guildford to Lady Jane Grey, May, 1553, but his plan to make himself the power behind the throne collapsed with the accession of Mary, and on Aug. 22 he was executed for treason. He was the father of Elizabeth's earl of Leicester.



John Dudley,
Duke of
Northumberland
After Holbein

Northumberland Avenue. A London thoroughfare. Connecting Trafalgar Square with the Victoria Embankment, it derives its name, like the neighbouring Northumberland Street, once Hartshorn Lane, from the former Northumberland House, which stood on the S. side of Charing Cross, 1605-1874. Opened in 1876, it contains the buildings of the Royal Empire Society, the Constitutional Club, offices of the S.P.C.K. and the Standard Bank of S. Africa, the Playhouse Theatre, and the former Victoria and Metropole hotels, which were taken over by the War office in the Second Great War.

Northumberland Fusiliers. ROYAL. Regiment of the British army. Raised privately in Holland in 1674 for service with the Dutch in their war against France, the regiment came to England in 1685 and was taken on the establishment as the 5th Foot. It served in Ireland with William III and then went to Flanders. At the battle of Wilhelmstahl in 1702 it defeated a French grenadier regiment, whose badge it adopted, though it was not designated a fusilier unit until 1836. It also captured the French colour which is still trooped every S. George's day. Service in the W. Indies earned the honour St. Lucia, 1778, and twelve honours and the regimental nickname,



Northumberland
Fusiliers badge

Ireland with William III and then went to Flanders. At the battle of Wilhelmstahl in 1702 it defeated a French grenadier regiment, whose badge it adopted, though it was not designated a fusilier unit until 1836. It also captured the French colour which is still trooped every S. George's day. Service in the W. Indies earned the honour St. Lucia, 1778, and twelve honours and the regimental nickname,

The Fighting Fifth, were gained under Wellington in the Peninsula.

The regiment was at the relief of Lucknow, with Roberts in Afghanistan, and with Gordon at Khartum. In the S. African War it distinguished itself at the Modder river. Fifty-two battalions were raised in the First Great War and won 67 honours, including Mons; Marne, 1914; Ypres, 1914, '15, '17, '18; St. Julien; Somme, 1916, '18; Scarpe, 1917, '18; Selle; Piave; Struma; Suvla. It was one of the first regiments in France in the Second Great War, and in 1940 formed part of the force defending Arras. The regimental depot is at Newcastle-upon-Tyne.

Northumbria. Kingdom of Anglo-Saxon Britain. It stretched from the Humber to the Forth, and from the Pennines and Ettrick Forest to the sea, and was formed about 600 by the union of the smaller kingdoms of Bernicia and Deira. Edwin, king of Northumbria until 633, was the most powerful ruler in the whole of England.

After 670 Northumbria declined in importance, and most of its later kings were subject to the rulers of Mercia or Wessex. See England: History.

North Walsham. Urban dist. and market town of Norfolk, England. It stands on the river Ant, 14 m. N. of Norwich and 131 from London, and has two rly. stations. The principal building is the Perpendicular church of S. Nicholas. At the Paston grammar school, founded 1606, Nelson was educated. The village of Paston is 3½ m. away. Market day, Thurs. Pop. 4,500.

North-West Europe Expeditionary Force. British troops sent to assist Norway after the German invasion. Commanded by Gen. B. Paget, the force landed April 15, 1940. The bulk were withdrawn from Namsos, May 1-2, and the last elements by June 10. See Narvik; Norway.

North-West Frontier Province. One of the four governor's provinces of the dominion of Pakistan. The river Indus is the E. boundary, except where the Punjab extends across it to the W. near the Kurram river, and where the prov. crosses the Indus to the E. in Hazara. Baluchistan and Afghanistan lie W., and Kashmir N.E. The Kabul, Kurram, and Gomal rivers cross the prov. from Afghanistan to join the Indus. The mts. are the Hindu Kush, Safed Koh, and Suleiman ranges.

The province was formed in 1901 and became autonomous with a single chamber legislature in 1937.



North-West Frontier Province of Pakistan. Map of the province on the border of Afghanistan

N.W.F.P. states, the prov. has area 14,263 sq. m.; pop. (1948 est.) 3,537,000. Area of the N.W.F.P. states, 24,985 sq. m.; pop. 2,464,000. Almost all the pop. are M. hms.

North-West Highway System. Name given to the Canadian section (1,257 m.) of the Alaska or Alcan Highway (q.v.).

North-West Mounted Police, ROYAL. Name formerly held by the special force of police keeping order in the sparsely populated parts of Canada. In 1919 it was merged in the new Canadian Mounted Police (q.v.).

North-West Passage. Name for a sea route N. of America once believed to afford a short cut to China. The search for it over four centuries belongs to the romance of exploration, and has supplied stirring stories of endeavour. Pioneers in the quest, which began with the rediscovery of America by John Cabot in 1497, were John Rut (1527), Willoughby and Chancellor (1553), Frobisher (1576), Davis (1585), Barents (1594-96), Hudson (1607-10), Baffin (1612). In the 19th century the search was renewed by the Royal Navy with the expeditions of Parry (1819-

Under British rule it comprised six districts and five political agencies. The districts were Dera Ismail Khan, Bannu, Kohat, Peshawar, Mardan, and Hazara; all of these are now included in the province. The agencies were N. Waziristan, S. Waziristan, Kurram, Khyber, and Malakand (Chitral, Swat, and Dir); these, with the tribal areas adjoining Hazara and including the states of Amband Phulera, are called the N.W. Frontier Province States.

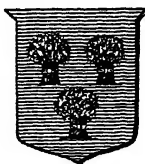
The prov. is mountainous, but about one-quarter of the area is under cultivation, wheat being the largest crop. Maize, sugar cane, fruit, and nuts are also grown. Sheep-rearing is important, the wool being woven into carpets. Goats are reared. Hydro-electric and irrigation projects in being and under construction are expected to make the prov. self-sufficient in food. The capital is Peshawar, dominating the Khyber Pass into Afghanistan. Excluding the

21), Beechey (1826), Ross (1829), and Franklin (1845). The passage was finally discovered by M'Clure 1850-53, though not traversed by him entirely by water; this was accomplished in 1903-05 by Amundsen, the Norwegian Arctic explorer. His record has since been twice broken by Capt. Larsen in the Royal Canadian Mounted Police schooner *St. Roch* which, on Arctic patrol duty, made the passage from W. to E. in 1940-42 and E. to W. in 86 days in 1944.

North-West Territories. Dist. of the dominion of Canada. Its total area is 1,309,682 sq. m., and

Northwich. Urban district and market town of Cheshire, England.

It stands at the junction of the rivers Dane and Weaver, and is connected by rly. with Chester, 18 m. to W.S.W. There are narrow cobbled streets and old houses, many of which have suffered from subsidence by the working of rock salt mines. These and its brine springs have long given fame to Northwich—its



Northwich arms

northerly salt town—but a chemical industry has supplanted the older trades. The history of the manor begins in 1483; the present urban district dates from 1875. It has had an M.P. since 1885. Interesting buildings are S. Helen's church (c. 1400), the salt museum, Brunner library, Victoria infirmary, and brine



Northwich. Old half-timbered houses and shops in this former salt-mining centre of Cheshire

it includes, save for Yukon and a section of Quebec, all that part of Canada lying above 60° N. which was formerly divided between Keewatin, Rupert's Land, and the North-Western Territory. It has three divisions, Franklin, Keewatin, and Mackenzie. The chief rivers are the Mackenzie, Slave, Great Fish, and Coppermine, and there are a number of lakes, Great Bear and Great Slave being the largest. Fur-bearing animals abound, and in parts the musk ox and the caribou are found.

The territories are now governed by a commissioner, his deputy, and a council of five members, and are watched over by the Royal Canadian Mounted Police. There is no capital, affairs being directed from Ottawa. Gold, silver, radium, uranium, and petroleum are worked, and some of the better land is under wheat, oats, and barley. Elsewhere only small trees, mosses, lichens, etc., are found. The territories are the remains of the vast area purchased from the Hudson Bay co. by the dominion in 1869. Various parts were subsequently taken away to form the new provinces of Alberta and Saskatchewan and to increase the area of the older ones, chiefly Ontario and Quebec. Pop. 12,028. See Canada.

paths. The Weaver is here navigable. Market day, Fri. Pop. 20,827.

Northwood. Residential dist. of Middlesex, England. It is 14 m. N.W. of London by rly., pleasantly situated in wooded country between Pinner and Rickmansworth. With Eastcote, Ruislip, and S. Ruislip it forms part of the urban dist. of Ruislip-Northwood. The parish church of Holy Trinity, 1854, is of flint, with a red tiled roof; in the churchyard are the graves of Sir R. Morier and the 1st Lord Ebury. The church of Emmanuel is modern. On Kewferry Hill is Mount Vernon hospital and Cancer research institute. There is also a war memorial hospital. Golf courses lie near. The urban dist. was the first in the country to be governed by an operative town-planning scheme. Pop. 65,710

Norton, CHARLES BOWYER ADDERLEY, 1st BARON (1814-1905). Born Aug. 2, 1814, and educated at Christ Church, Oxford, he inherited large estates in Warwickshire and Staffordshire from a great-uncle in 1826. Adderley was M.P. for Staffs from 1841 until in 1878 he was created Baron Norton. He was under-secretary for the colonies, 1866-68, and president of the board of trade, 1874-78.

He died March 28, 1905. He took a keen interest in educational and colonial questions, and was a pioneer of town planning. The title, remaining in the family, came in 1945 to Hubert, 6th baron (b. Feb. 21, 1886).

Norton, CAROLINE ELIZABETH SARAH (1808-77). A British poet and novelist. Born in London, grand-daughter of R. B. Sheridan, she was one of three beautiful sisters. Her husband, George Chapple Norton, whom she married in 1827, brought, and lost, an action against Lord Melbourne, 1836, alleging alienation of her affections. She left him; and further proceedings arising out of disputes on pecuniary matters instituted by her husband in 1853 moved Mrs. Norton to write a pamphlet, *English Laws for Women*. Of her earlier pamphlets, *A Voice from the Factories*, 1836, condemned child labour; *A Plain Letter to the Lord Chancellor* helped in the passing of an act, 1839, giving a woman separated from her husband the right to apply for access to her children. Her husband died in 1875, and in 1877 she married Sir William Stirling-Maxwell, but died June 15. Among her novels are *Stuart of Dunleath*, 1851; *Old Sir Douglas*, 1868. A well-known poem is that beginning *I do not love thee*. See *Diana of the Crossways*.



Caroline Norton, British writer After J. Hayter

Norton, CHARLES ELIOT (1827-1908). American scholar. Born at Cambridge, Mass., Nov. 16, 1827, he was educated at Harvard, and engaged for a time in business, voyaging to the East Indies in 1849. In 1853 he published an attack on experimental Socialism. During 1864-68 he was joint editor with Lowell of *The North American Review*. He was professor of fine arts at Harvard, 1875-1900. A powerful cultural influence was exerted by his *New Life of Dante*, 1859; *Notes of Travel and Study in Italy*, 1860; *History of Ancient Art*, 1891. He died Oct. 21, 1908.

Norton-Radstock. Urban district of Somerset, England. See Midsomer Norton; Radstock.

Norton Sound. Inlet of Bering Sea, Alaska. It lies S. of Seward Peninsula and is 100 m. across and 150 m. long. On the N. shore are Norton Bay and Godolphin Bay.

NORWAY AND ITS HISTORY

William Warbey, Chief English Press Officer to the Royal Norwegian Government, 1941-45

The physical features, constitution, and history of the old Viking country of Scandinavia are here described. An account of the Second Great War in Norway follows. See also Denmark; Narvik; Oslo; Sweden, etc.

Norway occupies the W. and N. parts of the Scandinavian pen. It extends from lat. 57° 17' N. to lat. 71° 11' N., and is bounded S. by the Skagerak, W. by the North Sea and Atlantic Ocean, N. by the Arctic Ocean, and E. by the U.S.S.R., Finland, and Sweden. The land area of Norway is 124,556 sq. m., and the country has a total length of 1,100 m., and a width varying from 8 to 250 m. The coast-line, measured as an unbroken line, is 1,700 m., but including every inlet, fjord, and larger island is 12,000 m. Spitsbergen, Bear I., and Jan Mayen Is. in the Arctic, Bouvet I., Peter 1st I. in the Antarctic, and the Antarctic continent between the Falkland Is. dependency and the Australian dependency are Norwegian possessions.

The greater part of Norway consists of lofty mountain ranges and plateaux of ancient igneous rock, with an average height of 1,600 ft. The greatest range is Kjölén (the Keel), running N. and S. and forming the natural frontier with Sweden. Its highest peaks in Norway are Sulitelma (6,153 ft.) and Jaekkevarre (5,950 ft.). The main watersheds of S. Norway are the Dovre and Long Mountains, the highest peaks being Galdhøppigen (8,399 ft.) and Glittertind (8,350 ft.) in Jotunheimen, and Snöhetta (7,615 ft.) in Dovrefjeld. The only low-lying areas are around the Oslo and Trondhjem fjords and in the extreme S.E. The plateaux are, however, broken up by numerous valleys, such as the Gudbrandsdal and Østerdal, which offer means of communication by road and rail. The whole of the W. and N. coast from Stavanger to the Russian frontier is deeply indented by long branching fjords, and fringed with islands and rocks called the Skærgård (skerries), which provide a sheltered waterway for the coastal steamers that are the principal means of communication in the W.

The S. coast is less indented, but the great Oslo fjord leading

into the heart of S.E. Norway is the main means of access to the country. Long narrow lakes are numerous, the largest being Mjøsa, 140 sq. m. in area. The rivers, apart from the Glomma (375 m. long), are short and turbulent, with high waterfalls, up to 850 ft., which are an abundant source of hydro-electric power. The whole country was once heavily glaciated, but now the glaciers cover fewer than 2,000 sq. m. and are diminishing every year. The largest are Jostedalbreen (580 sq. m.), W. of Jotunheimen, and Svartisen, near the Arctic circle.

The climate, under the influence of the Gulf stream and the prevailing S.W. winds, is temperate

but stormy and wet in the W. and N., while the S.E. has short, hot summers and long, cold but calm winters. All ports are permanently ice-free,



Norwegian flag, white and blue cross on red

though ice-breakers sometimes have to be used in the Oslo fjord. Mean Jan. temps. are: Oslo 22.3° F., Vardø on the Arctic ocean 22.1° F., Bergen 34.5° F.; July temps.: Oslo 62.2° F., Vardø 47.7° F., Bergen 57.4° F. Rainfall is high in the W., Bergen averaging 73 ins. p.a., and low in the E. (Oslo 26 ins.)

One quarter of the area of Norway is covered by forests, mainly coniferous, but with a sprinkling of deciduous trees on the lower slopes. N. of the Arctic circle the only trees are birch and dwarf willows. On the high ground of the interior above 3,000 ft. in the S. and above 1,600 ft. in the N., and on the coasts of Finnmark, Alpine vegetation and tundra prevail. Bilberries and whortleberries are plentiful in the forest areas. The principal wild animals in S. Norway are the fox, beaver, badger, stoat, weasel, elk, and roe-deer. The wolf is found in the dist. between Røros and Finnmark, the reindeer, Arctic fox, ptarmigan, and lemming in the Arctic and high mt. regions. Bird life is abundant. Salmon

and trout are common in the rivers of the W. and N., trout in the high lakes, and perch, pike, and grayling sporadically. Herring and codfish abound off the W. coast and mackerel in the S. Seals and several kinds of finner whale are also found.

CONSTITUTION. Norway has a written constitution, enacted in 1814 (since amended). It has a limited hereditary monarchy. The executive power is nominally vested in the king, who exercises his authority through a state council composed of the prime minister and not less than seven other members. The legislative power is exercised by the *storting* of 150 members elected directly for four years by all Norwegian men and women over the age of 21. The *storting* automatically assembles each year on the first week-day after Jan. 10. The *storting* elects one quarter of its members to form the *lagting*, the remainder constituting the *odelsting*. The *odelsting* originates bills and passes them to the *lagting*, which may approve a bill or send it back with comments. A bill twice rejected by the *lagting* is submitted to a joint session of the two *tings*, when a two-thirds majority is required to pass it. Budgetary and administrative matters are dealt with by the *storting* as a whole. The king has a right of veto, rarely exercised.

Norway is divided into 67 urban and 695 rural municipalities with popularly elected councils. They are entitled to levy a municipal income tax and are responsible for over one-third of the total public expenditure. The chairmen of all the rural municipalities in a *fylke* (county), of which there are 18, meet to form a *fylkesting*, before which the *fylkesmann*, appointed by the crown, presents the views of the central govt.

POPULATION, RELIGION, EDUCATION. Norwegians are mostly of Nordic type, with an admixture of an aboriginal stock of Alpine type. The majority are tall, blonde, and blue-eyed. The Lapps, of whom there are about 20,000 in N. Norway, probably came from central Asia. The pop. in 1946 was 3,123,883, a million more than in 1890. During the 19th century and the early part of the 20th century there was extensive emigration to the U.S.A. and Canada, the peak being reached in 1882 when 28,804 persons emigrated. Since 1911 emigration has declined.

The established religion is Evangelical Lutheran; 97 p.c. of

the pop. adhere to it. There are about 80,000 dissenters, including 3,000 R.C.s. During the German occupation of Norway in the Second Great War the Germans expelled and killed most of the 1,400 Jews, but in 1947 the govt. offered facilities to Jews to enter the country up to their pre-war number. The king is the head of the church and appoints the seven bishops, the deans, and the lower clergy. Primary school education, compulsory and free from seven to 14 years of age, is of a high standard. This is followed by a comprehensive system of further education at very low fees, with generous maintenance grants. Private schools scarcely exist. There is a university at Oslo, founded 1811, a technical college of university rank at Trondheim, and technical high schools for agriculture, dentistry, and commerce. There are also people's colleges providing short-term courses for young people and adults. The Bergen meteorological research school has played a leading part in the development of current methods of observation and analysis. The press flourishes, and even small towns publish their own daily newspapers.

NATIONAL DEFENCE. A large part of Norway's small navy was sunk during the Second Great War; most of the post-war navy, consisting of seven destroyers, five torpedo boats, five submarines, three corvettes, and a number of smaller vessels, was purchased from the U.K. The complement in 1946 was 8,000 officers and men. The air force was equipped with Mosquitos, Catalinas, and Spitfires. Just over 23,000 men are called up each year for 12 months' military training; the total in the three services on Feb. 1, 1947, was 34,442.

INDUSTRY AND TRADE. Until the 1890s Norway was predominantly an agricultural country, but the adaptation of water power to the generation of electricity led to an industrial revolution. In 1930, 37 p.c. of the pop. were engaged in agriculture, forestry, and fishing, 31 p.c. in industry and crafts, 21 p.c. in trade, transport, and shipping.

Agriculture is rendered difficult by the geographical configuration of the country. Only 3 p.c. of the area, a smaller proportion than in any other country of W. Europe, is arable, although the area under cultivation has increased steadily in each year. Norway is self-

sufficient in potatoes and dairy products, but only two-fifths of her cereal requirements are grown at home, chiefly in the form of oats and barley. In 1945 livestock included 1½ million cattle, nearly a million sheep, 171,723 pigs, 141,628 goats (pre-war figures were 1½ million cattle, 1·7 million sheep, 362,000 pigs, 249,000 goats).

In N. Norway 130,000 reindeer provide the Lapps with draught animals and, in emergencies, food. Fur production, mostly from foxes, expanded between the two Great Wars. In 1939 Norway had 493,000 silver foxes, reduced in 1945 to 66,469. The Norwegian forests, which produce about 15·5 million cu. yds. of timber annually, provide the basis for important sawn timber, furniture, wood pulp, cellulose, and paper industries.

The Norwegian Fisheries

The Norwegian fisheries are the largest in Europe, with a catch in 1946 of 835,000 tons. The cod and herring fisheries are the most important, the centres of the former being the Lofoten Is. and Finnmark, while herring are caught along the W. coast of S. Norway. Most of the cod is exported, unsalted as stockfish, or salted and dried as klipfish. The annual yield of cod liver oil is more than three million gallons. The bulk of the herring catch is used to provide herring-oil for margarine, etc.

Sprats and brislings are canned for export at the canning factories in Stavanger. Whaling is no longer carried on in Norwegian waters, but Norwegian whaling expeditions were the first to exploit the Antarctic fields, and have maintained a leading position despite severe war losses. The 1938-39 season produced 735,000 barrels of oil, valued at £1,895,000; the 1946-47 season 937,319 barrels, valued at £13,500,000.

Norway has no coal, except in Spitsbergen, where the mines produced over 300,000 tons annually before the Second Great War. Low-grade iron ores are plentiful, and about a million tons a year are produced from the mines at Kirkenes in N. Norway and near Kragerø and Arendal in the S. Norway is the world's largest producer of sulphur pyrites, with an annual output of over a million tons. Copper ore is worked at Røros, Sulitelma, and silver is mined at Kongsberg. Other minerals are molybdenum, nickel, chromium, titanium, and graphite.

Output of hydro-electric power is 1·4 million "all the year" kW.,

but resources are sufficient to provide nearly seven times as much. In 1937 the power produced in Norway averaged 3,189 kWh. per inhabitant, compared with 622 kWh. in Great Britain. The most important manufactures are electro-chemical and electro-metallurgical. Nitrates, of which the annual output is 600,000 tons, are produced at Rjukan, Odda, and near other waterfalls. Other important chemical products are carbide and cyanamide. The production of aluminium was expanded during the Second Great War from 29,000 to over 40,000 tons p.a. Ferro-alloys are an important group, and electric iron-smelting has been developed. In 1947 the construction of electric steel furnaces was started at Mo in Rana. Pre-war output of mechanical and chemical pulp reached nearly 1·5 million tons. The textile and clothing industries developed considerably between the two wars, as did the processing of foodstuffs. Shipbuilding is carried on in Oslo and Bergen, but the yards are small and most of the larger Norwegian merchant ships are built in British, Swedish, or Danish yards.

Balance of Trade

The principal exports are fresh, dried, and canned fish, fish oil, paper and pulp, ores, nitrates, iron and other metal alloys, aluminium, zinc, copper, carbide, and furs. Swedish iron ore is exported through Narvik. Norway normally spends one-third of her national income on imports, chiefly foodstuffs and fodder, coal, machinery, and ships. A favourable balance of trade has normally been assured through the earnings of the Norwegian merchant fleet, which, at 4,835,000 gross tons in 1939, was the fourth largest in the world. More than half the ships were less than 10 years old, there were 675 motorships, and tankers of an aggregate tonnage of 2·1 million tons. Most of these vessels were engaged in the tramp trade, but there were lines to all parts of the world. Nearly one-half was lost in the Second Great War, but by July, 1947, it had been built up again to 3,663,000 g.r.t.

Except in the far N., roads are good and adequate. The Arctic Highway, from Narvik to Kirkenes, is kept open for most of the winter with the aid of snow-shields and snow-ploughs. The coast towns are linked by regular services of coastal steamers. Rly. lines, most of them electrified, link Oslo with Bergen, Stavanger,

Trondhjem, and Bodö, and four lines run into Sweden. A line links Narvik with the Swedish iron mines and there is a short local line at Kirkenes. Norway has airports at Sola, near Stavanger, and at Oslo; internal airlines connect the principal towns, and there are services to Sweden, Denmark, the Netherlands, France, and the U.K.

LANGUAGE, LITERATURE, ART. The Norwegian language, like Danish and Swedish, belongs to the Germanic language group. During the period of Danish rule, from 1397 to 1814, Danish, spoken with a distinctive accent, gained precedence over the Norwegian language amongst the official classes and in literature. In the 19th century ardent Norwegian patriots evolved a literary form from the Norwegian peasant dialects, to which they gave the name *landsmål* (later officially called neo-Norwegian), in opposition to the near-Danish *riksmål*. A violent language conflict developed, and official attempts to fuse the two languages by reforms in orthography, grammar, and pronunciation have not completely succeeded. A modified *riksmål* is used in the towns and in most of the press and official publications, but the *landsmål* is used by many writers and in the schools of W. Norway and the rural areas.

Norwegian Literature

Old Norse literature, which flourished from the 9th to the 13th century, found its richest expression in the Icelandic sagas. The Norwegian court was a centre of scaldic poetry. During the period of Danish rule there was little distinctive Norwegian literature, apart from the satirical comedies of Holberg, who lived in Denmark, and the nature poems of the 17th century clergyman Peter Dass. The early 19th century saw a great revival, headed by the champions of national independence: the poets H. Wergeland and J. Welhaven, the language reformer Ivar Aasen, and the numerous collectors of folk poetry and music. In the latter half of the 19th century there came the literary giants, Henrik Ibsen (1828–1906) who, after writing historical plays, founded the drama of social criticism, and Bjørnstjerne Bjørnson (1832–1910) who wrote novels and plays and championed the national independence movements of the Norwegians, the Czechs, and the Poles. Associated with these two were the poets

J. Lie (1833–1908) and A. Kielland (1849–1906). The 20th century has produced the novelists Knut Hamsun (b. 1859), Sigrid Undset (b. 1882), Olav Duun (b. 1876), and J. Bojer (b. 1872), the dramatists G. Heiberg (1857–1929) and Helge Krog (b. 1889), and the poets O. Bull (1883–1933), A. Överland (b. 1889), and Nordahl Grieg (1902–43).

Norwegian musicians include Edvard Grieg (1843–1907), who derived much of his inspiration from Norwegian folk-tunes, C. Sinding (b. 1856), and J. Svendsen (1840–1911). Besides many

N. America on one of his voyages c. 1000. Norway was brought under one king for the first time in 872 when Harald the Fair-haired defeated the other chieftains at the battle of Hafrsfjord. At his death in 930 strife ensued between his sons and grandsons, but the kingdom was consolidated by his descendants Olav Trygvasson and Olav Haraldson (1016–1030), who introduced Christianity and was canonised after his death.

During the 11th century the crown, the church, and the nobility became firmly established. Many of the freeholding peasants



Norway. Map of the kingdom in western Scandinavia. Inset, environs of Oslo, the most populous area of the country

competent minor painters, Norway produced the leading exponent of expressionism and social-minded realism, Edvard Munch (1863–1944). Her leading sculptor is Gustav Vigeland, whose vast Park of Sculpture in Oslo took nearly 40 years to complete.

HISTORY. Norway was settled by men of Nordic type before the second millennium B.C. and that stock has since remained undisturbed. During the Viking period (800–1050) Norwegians established settlements in N. France (Normandy), Ireland, W. Scotland, the Isle of Man, and Northumbria, and colonised Iceland, Greenland, and the Faroe Is. Leif Ericsson probably reached

became tenant-farmers, but serfdom was never established. In the 12th century Hanseatic merchants settled in Bergen and obtained a firm grip on Norwegian commerce. The 13th century saw the peak of Norwegian power as an Atlantic empire, with both Iceland and Greenland acknowledging Norwegian suzerainty. The first setback came, however, with the defeat of Haakon IV by Alexander III of Scotland at the battle of Largs in 1263. As a result Haakon's son, Magnus VI, who earned the title Lawmender by codifying the provincial laws into a national civil code, abandoned Norwegian claims to Caithness and the Hebrides.

During the 14th century Norway was successively united, in consequence of royal marriages, with Sweden and Denmark, and in 1397 the three kingdoms were brought together in the union of Kalmar by Queen Margareta. Sweden broke away in 1449, but Norway remained under the autocratic rule of Danish kings until 1814. In 1496 the Orkneys and Shetlands were lost to Norway, in 1536 the Reformation was introduced by decree of the Danish state council, and in 1658 Norway lost three E. provs. to Sweden.

During the 17th and 18th centuries there was a revival of economic prosperity, and towards the end of the 18th, particularly after the French Revolution, a strong movement for national independence and democratic institutions began to develop. In 1814 the Swedish crown prince, Charles John, formerly Marshal Bernadotte of France, was persuaded by Tsar Alexander I to join the allied coalition against Napoleon, and to abandon the Swedish claim to Finland in return for Russian and British support of his plan to take Norway from Denmark, which had been forced on to Napoleon's side. After the defeat of Napoleon at Leipzig, Frederick VI of Denmark signed the treaty of Kiel, by which he surrendered his sovereign rights over Norway to Charles XIII of Sweden, but retained Iceland, Greenland, and the Faroes. The Norwegians objected to being treated as chattels, however, and persuaded the Danish *stadtholder*, Christian Frederick, to convoke a constituent assembly at Eidsvold.

Struggle for Independence

Meeting here from April 10 to May 17, the delegates asserted the independence of Norway, offered the crown to Christian Frederick, and drew up an advanced democratic constitution. Sweden invaded Norway to assert her rights, the powers intervened in support of Sweden, and an armistice was signed after 17 days. The *storting* met again and sanctioned the union with Sweden, but managed to secure the Swedish king's acceptance of their new constitution. As the century advanced a struggle developed between the Norwegian parliament and the Swedish king, who reserved the right to appoint and dismiss ministers at his pleasure. In 1882 the Norwegian Liberals, under Johan Sverdrup (1816-1892), took up the fight for parl. govt., and in 1884 Oscar II consented

to the formation of a Liberal govt. based upon a parl. majority. In the last quarter of the 19th century the Norwegian merchant navy leapt to the fore, and Norway acquired world-wide commercial interests which, it was felt, could not be adequately represented by a Swedish consular service. This provided a new motive for complete independence, and on June 7, 1905, the Norwegian *storting* voted for severance from Sweden. A plebiscite resulted in an overwhelming vote for a monarchical form of government, and on Nov. 18, 1905, Prince Charles of Denmark was formally elected king of Norway. He took the title of Haakon VII.

Twentieth-Century Progress

The period from 1880 to 1914 was one of swift economic development, which brought thousands of peasants' sons to the towns, and led to the birth of a Labour party (1887) and a centralised trade union movement (1899). Social reform came under the Liberal govts. of 1905-20, including the first Health Insurance Acts (1909 and 1915), measures for maternity and child welfare, a new Factory Act and an Eight-hour Day Act (1919). During the First Great War Norway was neutral, but half her merchant fleet, which plied chiefly in the service of the Allies, was sunk by German U-boats. Economic depression followed that war, and increasing social tension. For a time the Norwegian Labour party was affiliated to the Communist International, but it seceded in 1923. At the 1933 elections it was returned as the largest party in the *storting* and in 1935 a Labour govt. was formed which relied for its parl. majority sometimes on the Liberals and sometimes on the Agrarians. Up to the German invasion in 1940 it introduced fresh social reforms, including measures for old age pensions (1936), unemployment insurance (1938), and improved housing.

SECOND GREAT WAR. Efforts to form a Scandinavian neutral bloc broke down when Denmark was compelled, in 1939, to sign a non-aggression pact with Germany. When Hitler invaded Poland Norway declared her neutrality and took measures to strengthen her defences and lay in stocks of food and petrol. In the autumn of 1939 the Norwegian ship-owners' association signed an agreement with the British govt. promising to keep on charter to

the Allies the same tonnage of shipping as was normally used by them in peace-time. German attacks on Norwegian shipping during the seven months of Norwegian neutrality caused the loss of 377 lives and 54 merchant ships. At the same time German use of Norwegian territorial waters to evade the British sea blockade led to many controversies with the western powers, and on Feb. 16, 1940, a British naval party boarded the German vessel *Altmark* (*q.v.*) while it lay in the Jøssing fjord. Further incidents led to a British announcement on April 8, 1940, that mines would be laid in Norwegian waters. A few days before, Hitler had given final orders for the invasion of Norway and Denmark. On April 5 a fleet of troopships left Stettin for Norway, and on April 6 nine German destroyers left Bremen for Narvik. At 11.30 p.m. that day German warships, led by the 10,000-ton cruiser *Blücher*, sailed up the Oslo fjord and engaged the fortifications. A whaling boat and a small minelayer, which engaged the invading fleet, were sunk. Fort Iskarsborg, defending the narrow entrance to the inner fjord, opened fire and sank the *Blücher*, which was carrying the nucleus of the German police and civil administration.

The Nazi Invasion of 1940

Early in the morning of April 9 German airborne troops were landed at the Oslo airport at Fornebu, and quickly surrounded the capital. Meanwhile, the Norwegian cabinet had met, had rejected a German ultimatum to surrender, and had made arrangements to evacuate from the capital the royal family, the govt., and the civil administration. The *storting* was summoned, and met at Hamar, 100 m. N. of Oslo, the same afternoon, later moving on to Elverum to evade the pursuit of German forces. At these sessions full powers to carry on the fight, if necessary from abroad, were given to a new govt., still predominantly Labour in composition, but including representatives of the other political parties. In the capital Major Vidkun Quisling, leader of the tiny fascist National Union party, entered the radio station, and broadcast a statement that he had formed a govt. and had cancelled the mobilisation orders issued by the Norwegian general staff. Quisling's broadcast created some confusion for a few days, but when it became known that

Haakon and the real govt. were continuing the fight, most Norwegians quickly rallied round their leaders. On April 10 the German minister in Oslo presented to Haakon a demand that he should appoint Quisling as prime minister. The king indignantly refused, and nothing more was heard of Quisling until after the fighting in Norway was over.

The Fighting in Norway

Norwegian military resistance lasted for 62 days, against hopeless odds. In the first day all the main ports—Oslo, Stavanger, Bergen, Kristiansand, Trondhjem, and Narvik—had been captured by German warships, in most cases after heroic but futile resistance by small Norwegian forces. Airfields and military depots were seized by airborne troops. Except around Narvik, there was no organized front and resistance was mainly of a guerrilla character. The Allies promised support, and British, French, and Polish troops were landed. The British forces suffered from lack of suitable equipment, and from the fact that the best ports were in German hands. An attempt to hold the line of the Gudbrandsdal, from Åndalsnes to Lillehammer, failed, as did a move round the Trondhjem fjord, via Namsos and Steinkjaer. Only in the far North were successes recorded. In two engagements, on April 10 and 13, British naval forces sank all the nine German destroyers lying in the Ofoten fjord off Narvik. On May 26 Narvik itself was recaptured after a combined assault by Norwegian, French, and Polish troops, aided by British warships. A few days later, however, the Allies, owing to the menacing developments in France, decided to evacuate their forces from Norway, and the Norwegian forces themselves capitulated on June 9. Two days before, Haakon and the govt. left Tromsø for the U.K., in the cruiser *Devonshire*, after issuing a proclamation stating that they intended to continue the fight from outside Norway's frontiers. Norwegian losses in the two months' campaign totalled 2,000 men, over 20 small warships, and the whole of the small fleet of battle planes. The Germans lost more than 60,000 men, mostly drowned in troopships, and 21 warships totalling more than 50,000 tons.

The exiled govt. established itself in London, remaining there until the end of the war. Through the Norwegian shipping and trade

mission it organized the participation of 4,000,000 tons of Norwegian merchant shipping in the Allied war effort. Forty per cent of the oil and a large part of the food and munitions brought to Great Britain during the period before the U.S.A. entered the war were carried in Norwegian vessels. A new Norwegian army, recruited from all over the world and from young men who made daring escapes from Norway, was trained in Scotland. British, and later U.S., vessels were lent to create a new Norwegian navy which saw active service in convoy and patrol work. Norwegian airmen were trained in Canada, and gradually a new air force, consisting of two fighter squadrons and one seaplane squadron, was built up. Norwegian pilots, soldiers, and sailors also served in British units. The Norwegian govt. covered its own war expenses, chiefly through the earnings of the merchant fleet, which it requisitioned on April 22, 1940. In May, 1942, a small Norwegian force reoccupied Spitsbergen (which had been evacuated by the Allies in Sept., 1941), and set up a meteorological station there. They were attacked by German naval and air forces, but were eventually relieved from the air. A small Norwegian force also maintained a meteorological station on Jan Mayen I., in the Arctic. From time to time Norwegian forces participated in daring raids on the Norwegian coast, including one on Lofoten Is., from which over 300 Norwegian civilians were evacuated to Britain.

The Quisling Government

These raids brought encouragement to the Norwegian home front, which was passively resisting the invaders and the "quislings." After the Norwegian capitulation in June, 1940, there was a period of confusion and despondency, rendered worse by the defeat of France and the threatening battle of Britain. The German Reichskommissar, Josef Terboven, used this period to press a few prominent Norwegians, including members of the *storting*, to call upon Haakon to abdicate, and the govt. in London to resign. The king and the govt. rejected the proposal as unworthy and unconstitutional, and Terboven, after a further period of fruitless negotiations with Norwegian political leaders, resolved the situation in Nazi fashion by issuing a series of decrees. On Sept. 25, 1940, he declared the king and the exiled govt. deposed, dissolved all politi-

cal parties except Quisling's National Union, and appointed 13 Norwegians, either members of Quisling's party or pro-Germans, as acting councillors of state. This sham govt., which could act only with the approval of Terboven's own German administration, remained in "office" until the German capitulation in May, 1945. Despite repeated requests from Quisling, however, the Germans refused to sign a peace treaty with him.

Resistance to the Tyranny

The shock of the Terboven *diktat* of Sept. 25, 1940, brought home the meaning of Nazism to all Norwegians except the two p.c. or less who supported Quisling. From then on a ding-dong moral and political struggle was waged, with all sections of Norwegian society playing their part in turn. First to act were the members of the supreme court who resigned in a body in Dec., in protest against the Reichskommissar's interference with the independence of the Norwegian judiciary. In the same month the Norwegian sporting associations, with 300,000 members, refused to agree to the introduction of the *Führerprinzip* into their organizations, and started a strike which lasted throughout the occupation. During the same winter school strikes took place in Oslo, Bergen, and elsewhere after Quisling's stormtroopers, known as the *Hird*, had broken into several schools and maltreated teachers and children for their opposition to the Nazi "new order." In Feb., 1941, the seven bishops of Norway issued a pastoral letter roundly condemning the lawlessness of the *Hird* and the arbitrary acts of the Quisling "govt." This was the beginning of a long struggle in the course of which the Norwegian church, despite the deposition and confinement of the bishops and many of the clergy, repeatedly denounced the Nazi regime and called upon all Christians to resist its encroachments on religious and civil liberty.

On April 3, 1941, 22 Norwegian organizations combined to send a letter of protest to Terboven, concerning political interference with civil service appointments.

On May 15 a further letter was signed by 43 organizations, including the powerful T.U.C. In June the T.U.C. took up the struggle for the independence of the unions, and after a temporary concession the Reichskommissar struck hard on Sept. 10, declaring

a state of emergency in Oslo, executing two of the union leaders, arresting many others, and placing the unions in the hands of quisling "commissars." Despite this action, the Norwegian workers, led by the underground "free trade union movement," retained sufficient cohesion to defeat by mass opposition an attempt in Sept., 1942, to form a fascist "national assembly." The Norwegian teachers had their greatest trial in the same year, when they resigned in a body from the Nazi "teachers' front" set up by the quislings in Feb., 1942. In March 1,300 of them were arrested, and of these 650 were transported, in an old cargo vessel, to forced labour at the Arctic port of Kirkenes. They refused to give way, and the Germans were eventually compelled to release them.

Meanwhile an underground Home Front with a Home Army was gradually built up under the president of the supreme court, Paal Berg. At great risk, illegal news bulletins were distributed, wireless contact was maintained with Great Britain, patriots were smuggled over the frontier into Sweden, and in the later years of the war a special sabotage organization was built up which did great damage to German military supplies and communications. A successful Allied raid on the heavy water plant at Rjukan in Feb., 1943, was carried out with the aid of this organization.

On Oct. 25, 1944, Russian troops, pursuing the retreating Germans across Finland, entered the Norwegian port of Kirkenes, and advanced as far as the River Tana. Here they were held, and no more Norwegian territory was liberated until the surrender of Germany on May 8, 1945. On the night of May 7 the Norwegian Home Army emerged and took charge of the streets and main public buildings in Oslo. Three days later a govt. delegation, headed by Crown Prince Olav, arrived in the capital, and the Home Front placed itself under its authority. On May 31 the Norwegian govt. returned, amidst great public rejoicing, and three weeks later a new coalition govt., including two Communists, was formed under the premiership of Einar Gerhardsen, a former Labour mayor of Oslo, who had spent three years in a German concentration camp.

In Oct., 1945, a general election gave the Labour party for the

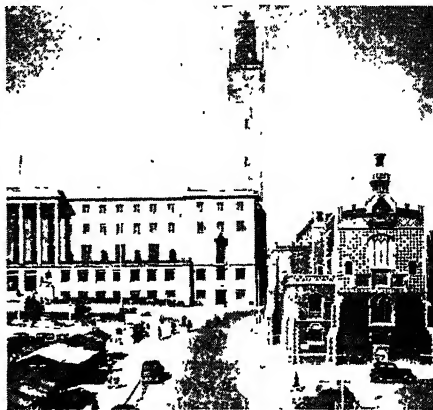
first time a clear majority, with 76 seats out of 150. Gerhardsen then formed a Labour administration to carry out a programme of reconstruction under vigorous state direction. Food, which had been extremely short during the occupation, rapidly increased in quantity, and within two years production and foreign trade indices were nearly back to pre-war levels. Democratic institutions, destroyed by the Nazis, were fully restored, the leading quislings were tried, and Quisling himself was executed, Oct. 24, 1945. In Feb., 1946, the Norwegian foreign secretary, Trygve Lie, was elected secretary-general of the United Nations.

Bibliography. The Constitution of the Kingdom of Norway, H. L. Braekstad, 1905; Norway and its Treasures, 1914, A. Wayfarer in Norway, 1935, S. J. Beckett; The New Norway, O. B. Grimley, 1939; Hitler Attacks Norway, H. K. Lehmkuhl, 1943; Norway in World History, W. Keilhan, 1944; Norway: A Handbook Compiled by the Royal Norwegian Govt., 1944; Look to Norway. W. N. Warbey, 1946.

Nor'-Wester. Warm dry föhn wind which blows over the Canterbury Plains, E. of the mts. of the S. Island of New Zealand. It is the prevailing wind, which, having crossed the Southern Alps, to whose W. slopes it brings a heavy rainfall, descends to the E. plains, and in so doing is warmed by compression.

Norwich. City and county borough of Norfolk, England, also the county town. It stands on the Wensum, near its junction with the Yare, and is 114 m. N.E. of London. The city and environs are served by rly. and Eastern Counties buses. Its chief magistrate has been known since 1910 as the lord mayor.

The principal building is the cathedral of Holy Trinity, begun in Norman times, but not completed until about 1500. It displays several styles of architecture; features are the long and splendid nave, the lofty spire, and the two



Norwich, Norfolk. The City Hall in the Market Square; it was opened by King George VI in 1938. The ancient guildhall is seen on the right

Val Doonee

apsidal chapels. Two old gateways lead to it, and near are the cloisters, bishop's palace, deanery, and other buildings connected with the foundation. Of the other churches, the chief are S. Peter Mancroft, a large and noble building, S. Michael-at-Coslany, S. Giles, S. Andrew, and S. Lawrence. The fine R.C. cathedral is modern.

Of secular buildings the chief is S. Andrew's Hall. Originally the nave of a monastic church, built in the 15th century, its proportions make it a public hall of unusual magnificence. The guildhall was built in the 15th century. The grammar school was once a chapel. Other buildings include the shire hall, corn exchange, and a drill hall, and there are hospitals, libraries, a technical college, and a training school. Of the castle little more than the keep, dungeons, and battlements remain; it is now used as a museum and art gallery housing the most comprehensive collection in England of paintings of the Norwich school. Borrow's house is also a museum. The Maid's Head Hotel is a picturesque old building. Bishop Bridge of the 13th century is still used, and the Strangers' Hall dates from the 15th century. The charitable foundations include the old hospital of S. Giles. There is a theatre, and in 1921 a playhouse, near the site of one closed by Cromwell, was opened by the Norwich players as the Maddermarket Theatre; it is designed as were the theatres of Shakespeare's day, the only one of its kind in England.

The industries of Norwich include engineering works and the making of boots and shoes, crape,



Norwich arms

beer, starch, mustard, etc. There is a trade along the river, and the city is the business centre of a large district, being still in a sense the capital of E. Anglia. It is the headquarters of important insurance companies, but amalgamations have made its banks less prominent than formerly. Still an

staple for wool was fixed here, and Flemings settled. Made a county of itself in 1404, the city became, through the wool and worsted industry, one of the richest in England. Separately represented in parliament since 1298, it now has 2 M.P.s. Pop. est. 114,750. *Consult*

Records of the City of Norwich, W. Hudson and J. C. Tingey, 1904-10; Norwich Cathedral, C.H.B. Quennell, 1898; The Story of Norwich, E. Henderson, 1911; Autobiography with a Difference, R. H. Mottram 1938.

Norwich. City of Connecticut, U.S.A., and co. seat of New London co. It stands on the Thames river, at the head of navigation, 49 m. S.E. of Hartford, and is served by the New York, New Haven and Hartford, and the Central Vermont rlys., and by steamers plying to New York and other ports. Norwich was settled in 1659, and received a city charter in 1784. Pop. 23,652.

Norwood. Residential dist. of S.E. London. It forms the S. part and a bor. constituency of Lambeth, lying between Streatham to the W., Sydenham E., and Croydon S. At West Norwood is the S. Metropolitan cemetery of about 40 acres, founded in 1846. To the W. of it is the Jews' Hospital, built 1863; it was founded at Mile End in 1806. Near Norwood Park is the R.C. convent of Our Lady, with orphanage, founded in 1848. The Royal Normal College and Academy of Music for the Blind was established at Upper Norwood in 1874. In the 17th century Norwood was covered by an oak wood; a spa, called Beulah Spa, was opened here on a large scale in 1831, but had a brief existence. Gipsy Hill, part of Norwood, commemorates the fact that the district was once a favourite haunt of gipsies. Norwood Green covers about 10 acres, and Norwood Park about 33 acres. Population 85,580.

Norwood, Sir Cyril (b. 1875). British educationist. Born Sept. 15, 1875, and educated at Merchant Taylors' School and S. John's College, Oxford, he became a clerk in the Admiralty, but resigned in 1901 on appointment as a schoolmaster at Leeds. During 1906-16

he was headmaster of Bristol Grammar School, becoming master of Marlborough, 1916, and headmaster of Harrow, 1926.

In 1934 he resigned to become president of S. John's, Oxford, an appointment he held until his retirement in Dec., 1946. He was chairman

of the secondary schools examination council, 1921-46, and of the committee on curricula and examinations, 1946, which produced the Norwood report. He was elected chairman of the Modern Churchman's Union, 1937, and re-elected, 1942. He published several works on British education.

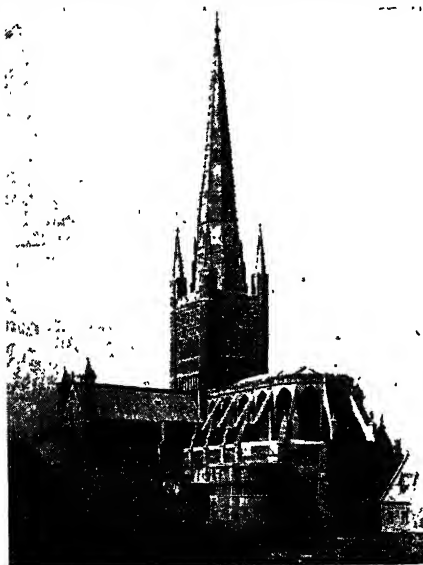
Norwood, Frederick William. Contemporary Australian churchman. He was educated at Ormond College, Melbourne, and became in turn pastor of the Congregational churches at Canterbury (Victoria), Brunswick (Victoria), and North Adelaide. He was appointed minister of the City Temple, High Holborn, London, in 1919, and remained there until 1936, when he became an evangelist under the auspices of the National Free Church Council. He was chairman of the Congregational Union of England and Wales, 1930-31. Crossing to Canada, he became a minister at Vancouver in 1939, and in 1943 became pastor of S. James' United Church, Montreal. He published several books, mostly on religious subjects, and including *Indiscretions of a Preacher*, 1932; *Beaten by the Divine*, 1933.

Nose. Organ of the sense of smell, also used in respiration. In human beings it forms a prominence, variable in size, situated in the middle line of the face. It ends below in the nostrils, which mark the entrance to the two nasal cavities between the base of the skull and the roof of the mouth.

The roof, sides, and floor of the cavities are formed of certain bones of the skull. The roof is composed of a bone perforated like a sieve to afford passage to the nerve of smell. The sides are each covered by three highly vascular bodies (the turbinals) which moisten and warm the air passing through. When swollen, these bodies give rise to a stuffiness of the nose experienced by everyone suffering



Sir Cyril Norwood,
British educationist

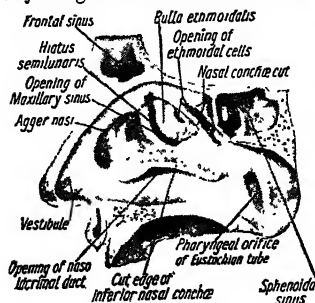


Norwich. Cathedral of Holy Trinity, from the south-east. Parts date from Norman times
Frith

important agricultural centre, it has a large cattle market, and is known for canaries. The borough includes Carrow, where there was a Benedictine abbey in the Middle Ages, and Thorpe. Mousehold Heath, the subject of a famous painting by Crome, is public property. Norwich is remarkable as a centre of literature and art and for the eminent persons associated with it; they include Sir Thomas Browne, Borrow, and Crome; Coke and Nelson, who were educated in its grammar school; the Martineaus, the Gurneys, and Edith Cavell. It was subjected by the Germans to "Baedeker raids" on April 27 and 29, 1942.

Norwich was founded by the Anglo-Saxon invaders of Britain, and in the 10th century or earlier was an important town. In 1094 the E. Anglican bishopric was brought here from Thetford, and about the same time the castle was built. Attached to the cathedral was a monastery. The citizens, growing rich, bought various charters giving them liberties and privileges, and walls were built around the city. In the 14th century a

from a cold in the head. Several cavities are present in the bones adjoining the sides of the nose, and



Nose. Sectional diagram showing lateral wall and principal parts of the organ

open into it by small holes. These holes may become blocked by catarrh or infection, and severe headache can result. The pain is caused not by pressure resulting from blockage, but by the negative pressure caused by the absorption of the air normally present in the cavities, the sinuses, no more being able to enter. The condition is relieved by sprays and inhalations which shrink the mucous membrane. The floor runs straight back from the nostrils to the nasopharynx, parallel with the roof of the mouth. The two cavities are separated from one another by the septum, which is principally composed of cartilage.

The point of the nose is composed of cartilage covered by skin externally, and jointed to the bony framework of the rest of the nose, giving softness and mobility to the point. The nerve of smell breaks up into many branches, which end in the upper parts of the septum and sides of the nose. This region is therefore termed the olfactory region, or the part of the nose used for smelling. Often after acute diseases, especially influenza, this area may cease to function. The rest of the nose is supplied by nerves of common sensibility and is used for breathing. It is therefore termed the respiratory region of the nose.

The sense of smell varies much in different individuals, and in different animals. It is highly developed in herbivora and carnivora, the dog, for example, depending on the sense of smell almost as much as on sight. Taste and smell are intimately connected. Digestion is greatly assisted by the agreeable stimulation of both senses.

To avoid irritation of the throat and lungs all the air should be drawn through the nose in order

that it may be warmed and moistened and rendered harmless to these important organs. See Adenoids; Anatomy; Head; Man; Smell.

Nosean or **NOSFLITE**. Member of the feldspathoid group of minerals, composed of sodium aluminium silicate with calcium sulphate, $3(\text{Na}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2) \cdot 2\text{CaSO}_4$. It occurs as greyish or brownish cubic crystals and grains in certain igneous rocks, mostly of volcanic origin, that are low in silica and rich in alkali.

Nose-ornament. Object worn in or on the nose, usually by passing it or a subsidiary ring or hook through a perforation. Made of bone, shell, feather, quill, tooth, wood, pearl, or metal, sometimes engraved or jewelled, its purpose was originally amuletic.

Nose-pins, especially characteristic of Melanesia and Australia, are usually passed through the septum, the rite of piercing being sometimes completed by drawing a live snake through the perforation. Corpses with unpierced noses have the rite performed upon them, to avoid discomfort to the ghost in the afterworld.

Metal nose-rings, which may have antedated earrings in W. Asia, were adopted by the Hebrew people. Many O.T. references to rings concern nose-ornaments, as in Gen. 24. They were removed on the Sabbath. The khizam, worn by women in Cairo and among some Beduin tribes, is usually of brass, with red or blue glass beads. The practice drifted across Africa to Nyasaland and the Gambia; the Yorubaland Egba insert coral plugs in the left nostril. Nose-rings became especially developed in India, among both Hindu and Mahomedan women. Tattooing of the nose also occurs.

Nosology (Gr. *nosos*, disease; *logos*, science). A science which deals with the classification and nomenclature of diseases. No general system has been agreed upon by doctors for this classification, but Nomenclature of Diseases of the Royal College of Physicians, a compilation originally due to Dr. William Farr in 1837, has been adopted with amendments by various countries.

Nossi-Bé or **Nossy-Bé**. Island off the W. coast of Madagascar. Belonging to France, it is situated

at the entrance to the Bay of Passandava. It is mountainous and volcanic. Its chief town, Hellville, named after Governor Hell, who took possession of the island in 1841, has an excellent harbour. The neighbouring islands are Nossi-Mitsiou, Nossi-Comba, Nossi-Sakatra, and Nossi-Faly. Area of Nossi-Bé, 130 sq. m.

Nostalgia (Gr. *nostos*, return; *algos*, grief). Homesickness, and a common symptom of regression (*q.v.*). In periods of strain, when adjustment to adult life or a new environment is painful and difficult, a longing is felt to return to a phase in which the individual was sheltered and happy. In bad cases the desire will be for a return to a childish state when everything was provided and there was no need to face responsibilities. This feeling precludes any real attempt to cope with life. It is sometimes found to be an early symptom of melancholia (*q.v.*).

Nostoc. Mucilaginous plants of the family Nostocaceae, of the



Nose-ornament. Examples worn by different races of mankind. Left to right: Sudanese negress; Tamil girl; Papuan wearing tusks of a wild boar

division Protophyta, or simplest plants. They are exceedingly fine filaments, consisting of a large number of minute cells attached in a single series, which under the microscope presents the appearance of a necklace of pearls or beads. One or more of these filaments, coiled or twisted, are enclosed in hyaline jelly, and these masses, varying from 0.2 mm. to an inch in diam., float on bog-pools, appear on gravel paths, damp soil, or on rotting timber. They are often tinted green, violet, or blue. Sometimes they inhabit the cells of higher plants. *N. edule* is utilised by the Chinese as a soup ingredient. *N. commune*, the common species, is in some districts known as falling stars.

Nostradamus (1503-66). A French astrologer. Michel de Notredame was born of Jewish parents at St. Rémy, Provence, Dec. 13, 1503. After studying philosophy at Avignon, he became a doctor at Montpellier, and in 1544 established himself at Salon near Aix. He gained a reputation for cures during the plague which

ravaged the country, and in 1555 published at Lyons a book of prophecies (in rhymed quatrains) known as *Centuries*. In these he forecast the death of Henry II in a tournament and events of French history up to the Revolution. He became physician to Charles IX, and died July 2, 1566.

Nosu. Aboriginal people in S.W. China. Occupying the mountain region where Yunnan, Szechwan, and Kweichow meet, they represent a stock of Tibetan origin and primitive culture, who spread E. into the plains, driving before them the earlier Yao. They resisted the Manchu domination until early in the 18th century, when they were thrust back into the uplands above the 6,000 ft. level. They maintain feudal institutions and animistic practices.

Notables. Prominent personages formerly convoked in extraordinary council by kings of France. Dating from the 14th century, the council was called in times of national emergency, but had no powers, being purely consultative. The two most famous occasions of its being called were in 1787, when Louis XVI appealed to the notables for advice on the increasing difficulties of the monarchy, and was advised to convoke the states-general; and in 1788, when they were summoned to give advice on the representation of the Third Estate, and by their reactionary attitude deepened the public discontent and hastened the Revolution. See French Revolution; States-General.

Notary (Lat. *nota*, note). In England, originally an officer in the ecclesiastical courts. Notaries are still admitted by the archbishop of Canterbury through his representatives, but their duties are mainly secular. They serve an apprenticeship and pass an examination, and, in London, must belong to the Scriveners' Company. A notary attests or certifies documents, mainly in connexion with a failure to meet bills of exchange. There is a society of public notaries. In England a notary is usually a solicitor; in Scotland he must be a solicitor. Among the Romans the notary originally was a slave or freedman employed as a shorthand reporter of proceedings in the senate and law courts.

Notation. Musical term, meaning the use of signs to represent musical sounds. Its evolution has been slow, and no system is perfect for all purposes. Three chief methods have been employed: (1) representing scale relations, as

in the phonetic systems of the Hindus and Chinese, the old Greek systems, the modern Paris-Galin-Chev  figure notation, and the Tonic Sol-fa notation; (2) representing the fingering of certain instruments, known as *tablature*; (3) representing fixed pitch, as in the ordinary staff notation of modern W. Europe. Each of these methods of showing pitch is aided by time symbols of various kinds. See Musical Terms; Pitch; Stave; *Tablature*; Time; Tonic Sol-fa.

Notation. System of figures and signs used in arithmetic and algebra to denote numbers and operations. See Arithmetic.

Notes and Queries.

London weekly paper established Nov. 3, 1849, by W. J. Thoms, to form a medium for the exchange of knowledge between literary men and others. A monthly journal during the First Great War, it reverted to its weekly form in 1920, but became a fortnightly in July, 1942. It was purchased by *The Times* in 1920, and taken over by the Oxford University Press in 1939.

Notice. In English law, a term in frequent use, usually meaning knowledge of a fact. Sometimes, however, it merely means knowledge of some other fact, which ought to induce a careful and prudent man to make inquiry, from which inquiry he would probably have discovered the fact in question. In equity, a purchaser for value without notice of any defect in his vendor's title is always in a strong position. Thus if A has borrowed money from X on the deposit of his title deeds, and A, afterwards obtaining the deeds somehow from the lender, takes them and sells the property to B, as being unencumbered, B takes the property free from the charge. But if there was some fact or circumstance which ought to have put B on inquiry, and he did not choose to inquire, he may have to hold the property subject to X's loan. At common law, if the holder of a bill of exchange takes it with notice of any fraud in its inception or transfer, he will have no better title to it than his transferor had.

Notification. For notification of diseases, including list of notifiable diseases, see Disease.

Noto. Town of Sicily, in the prov. of Syracuse. It stands 2 m.

from the Mediterranean and 21 m. by rly. S.W. of Syracuse. It has some handsome palaces and an archaeological museum. There are prehistoric tombs, Greek cemeteries, and Christian catacombs. Trade is carried on in corn, oil, and wine. The present town was built in 1703, ten years after the destruction by earthquake of the medieval city, which occupied the site of Netum, a Sikel city 5 m. to the N. Pop. 32,000.

Notochord (Gr. *n tos*, back; *chord *, cord). In embryology, a cellular, cartilage-like rod, which appears in the embryo of vertebrates and forms the basis of the vertebral column. Except in the lowest forms of vertebrates it disappears after the embryo stage, and is replaced by the vertebral column. See Vertebrates.

Notornis. Very rare New Zealand bird. It belongs to the *Ralliformes*. The best known species has greenish plumage on the back, with head, neck, and under parts purple. Its wings are rudimentary and it cannot fly, but runs



Notornis. Very rare bird of New Zealand

fast. Living specimens were caught in 1849, 1851, 1879, and 1898. Then in 1948 three were seen and two captured, examined, photographed, and released, near lake Te Anau. Later that year an expedition to the area filmed 20 breeding pairs.

No Treating Order. Drink restriction in Great Britain during the First Great War. Early in the war complaints were made as to the excessive drinking in munition areas, and its harmful effect on the output of urgent supplies, also as to the injury to soldiers on leave by well-meaning persons treating them to alcoholic liquor. As part of the wider scheme to regulate the drink traffic, the central control board issued an order in Nov., 1915, prohibiting treating. No one could purchase in licensed premises or clubs an alcoholic drink for another person. Infringement of the order was punishable by a fine. The order was in force until 1919.

Notre Dame (Fr., Our Lady). In French ecclesiology, name for the Virgin Mary. Numerous churches are thus dedicated, in Paris and elsewhere, notably the cathedral, *Note Dame de Paris*. Situated in the  le de la Cit , this cathedral stands on the site of a 7th century church of S.  tienne and of a church of *Notre Dame* res

built in the 9th century. Begun in 1163, and completed early in the 14th century, the existing building was converted into a Temple of Reason, 1793-94.

The building was reopened in 1795 for divine worship, handed over to the R.C. Church in 1802, restored in 1845, and damaged by the Communards in 1871. A magnificent example of decorated Gothic architecture, its length is 390 ft. Two towers have quaint gargoyles on their balustrades and are 226 ft. high. The fine sculptured façade was completed in 1240. The aisles are prolonged round the choir, there are 37 chapels, and beautiful old glass in the rose windows of the transepts, between which rises the 315-ft. spire. See Apse; Paris.

Notre Dame Bay. Arm of the Atlantic Ocean, on the N. coast of Newfoundland. It lies between Cape St. John and Fogo Island, a distance of 45 m.; the E. end contains an extensive archipelago in the Bay of Exploits.

Notre Dame de Paris. Romance of medieval Paris by Victor Hugo, first published in 1831. Full of character, exciting incident, and vivid action, it ranks as one of its author's masterpieces of fiction. Quasimodo, the hunchback of Notre Dame, and Esmeralda, the gipsy girl with her goat, Djali, are numbered among the familiar figures of fiction.

Nottingham. City, parl. and co. borough, market town, and the co. town of Nottinghamshire, England. It stands on the N. or left bank of the Trent, 123 m. N.N.W. of London, and is served by rlys. and canals. Its area,

since the extension of the boundaries in 1932, is 16,166 acres. It was made a city in 1897, and in 1928 its chief magistrate became a lord mayor. Pop. est. 297,000.



Nottingham arms

The town probably originated in an Anglo-Saxon settlement. It was later a Danish burgh. It was soon recovered from the Danes, and Edward the Elder is said to have walled the town, built a bridge across the river, and erected a mint. A castle was built on a rock overlooking the Trent by a follower of William I soon after the Norman Conquest.

In the Middle Ages Nottingham was an important borough and its castle a regular royal residence. It received charters making it a corporate town and bestowing privileges upon its citizens; in 1448 it was made a county of itself, and at one time comprised two boroughs, one French and the other English, each with its own laws and customs. Here Isabella, queen of Edward II, was captured with her lover, Roger Mortimer. In 1642 Charles I set up the royal standard on a spot still known as Standard Hill, and the castle was held by Colonel Hutchinson throughout the Civil War.

The city's modern history is mainly that of its growth into a great manufacturing centre, although the Reform riots of 1831, when the castle was destroyed, must not be forgotten. Industrial development began early and the

town soon had ironworks and foundries, from which issued the bell, Great Tom, afterwards hung in Lincoln cathedral. Nottingham became a seat of the stocking trade in the 18th century.

Lace making, for which Nottingham is famous, is the direct natural descendant of the older stocking making trade, as the first lace was made here on a stocking frame in 1760. The lace is made in factories in the adjoining districts as well as in the city itself, being finished in the warehouses of the city. Connected with this industry are bleaching and dyeing establishments, and there are works for the manufacture of lace machines. An offshoot of the lace trade is the making of blouses, aprons, underwear, etc., and veilings and embroideries and men's and boys' clothing are made. Hosiery also employs many. There are engineering works, the output of cycles being great, large tanneries and tobacco factories, while soap and drugs are other products. Other industries are brewing and malting, cotton spinning, boxmaking, brickmaking, and colour printing. There is a transit trade along the river, and the city has cattle markets. Goose Fair, held annually in Oct., is an ancient institution.

A feature of Nottingham was the immense market place in the centre of the city. This has now been laid out as a magnificent square with processional way leading to the fine council house. The chief church is S. Mary's, a fine Perpendicular structure of the 15th century; S. Peter and S. Nicholas are old foundations. The R.C. church of S. Barnabas is a noble building.

Sir Jesse Boot (Lord Trent) gave £750,000 for the laying out of the University Boulevard and the beautiful buildings adjacent to it, opened 1928. (See N.V.)

The castle, acquired and rebuilt by the corporation after 1831, is now an art gallery. The old university college in Shakespeare St. is a fine pile. The Guildhall, a modern edifice, is the headquarters of the city's official business. The Albert, Victoria, and Mechanics' Halls are large public buildings. A new and spacious cattle market has replaced the older one. The city contains numerous open spaces including the Forest and the Arboretum. On Bulwell Forest and in Bulwell Hall Park are municipal golf links. Trent Bridge is famous as a centre of county and international cricket.



Nottingham. The Council House dominating the Square and processional way

The city is governed by a lord mayor, sheriff, and council, consisting of aldermen and councillors from its 16 wards. The city has a recorder, who holds here courts of quarter sessions, and it is an assize town. It sends four members to parliament, and has two daily papers, *The Guardian* and *The Journal*, and also two evening papers.

Nottingham, CHARLES HOWARD, EARL OF (1536-1624). English sailor. The eldest son of Lord Howard

of Effingham, lord high admiral of England, and first cousin to Anne Boleyn, he served at sea as a youth, and after Elizabeth's accession occupied several court appointments before he became lord high admiral in 1585. A gallant and able sailor. He was in command when the *Armada* (*q.v.*) appeared and was largely responsible for its defeat. In 1596 he and Essex sailed to Cadiz and sacked the town, and on his return he was created earl of Nottingham. In 1599 he was given command of all the sea and land forces. He died at Croydon, Dec. 14, 1624, and was buried at Reigate.



Charles Howard,
Earl of Nottingham
After C. Janssen

ments before he became lord high admiral in 1585. A gallant and able sailor. He was in command when the *Armada* (*q.v.*) appeared and was largely responsible for its defeat. In 1596 he and Essex sailed to Cadiz and sacked the town, and on his return he was created earl of Nottingham. In 1599 he was given command of all the sea and land forces. He died at Croydon, Dec. 14, 1624, and was buried at Reigate.

Nottingham, HENEGAGE FINCH, 1ST EARL OF (1621-82). English politician. Born Dec. 23, 1621, the son of Sir Henegage Finch, Speaker of the house of commons, he was educated at Westminster and Christ Church, Oxford, and called to the bar in 1645. Entering parliament in 1660, he was made solicitor-general, and in 1674 lord chancellor and a baron. Created an earl in 1681, he died Dec. 18, 1682.

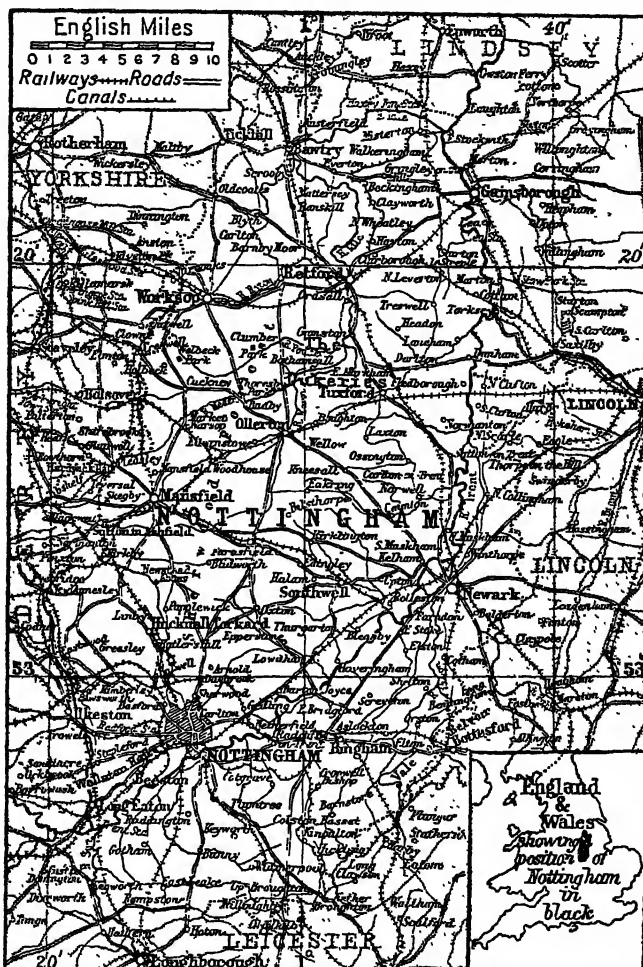


Henegage Finch,
Earl of Nottingham
After Lely

Nottingham, DANIEL FINCH, 2ND EARL OF (1647-1730). English politician. Son of Henegage Finch, earl of Nottingham. He early entered



Daniel Finch,
Earl of Nottingham,
English politician
After Kneller



Nottinghamshire. Map of this industrial and agricultural inland county of the north midlands of England

public life, became a privy councillor and a lord of the admiralty, and was one of James II's warmest supporters until alienated by that monarch's ecclesiastical policy. He took no part in bringing about the Revolution, but in 1690 was one of the council chosen to assist Queen Mary during the king's absence in Ireland. At George I's accession Nottingham was made president of the council, but he lost favour in 1716. He died Jan. 1, 1730.

Nottinghamshire. County of England. Wholly inland, its area is 844 sq. m. It is in the main a level region, much of it being the valley of the Trent, but there are wolds in the S. and some hills in the W. The chief river is the Trent; others are its tributaries, the Idle and the Erewash, which

latter separates the county from Derbyshire.

Notts may be divided roughly into a coal-mining and industrial area in the S. and S.W., and an agricultural one in the N.E. and S.E. Barley and oats are grown; sheep and cattle are reared. A large quantity of coal is produced, mining having begun in the Middle Ages; lace manufacture is a traditional industry, and that of hosiery was introduced in the 16th century; also there are engineering works. Main rlys. to N. and canals pass through the co. In it are the remains of Sherwood Forest including the



Nottinghamshire
arms

district known as the Dukeries (*q.v.*). Other places of interest are Cresswell Crags, where traces of primitive man have been found, and the fine houses of Welbeck, Thoresby, Clumber, Newstead, and Wollaton. There are remains of monasteries at Newstead, Thurgarton, and elsewhere. Nottingham is the county town; other boroughs are Mansfield, Newark, Retford, and Worksop. Six co. members are returned to parliament. Notts is mainly in the diocese of Southwell. Before the Norman Conquest, it was part of Mercia. It passed under the control of the Danes, and there are traces of Danish settlements. Population 712,731.

LITERARY ASSOCIATIONS. The most prominent figure is Byron, who passed much of his early life at Southwell and Newstead, and is buried at Hucknall Torkard. Other poets of the county are H. K. White and P. J. Bailey, both born at Nottingham. D. H. Lawrence was born at Eastwood. Thomas Cranmer came from Aslockton, and Erasmus Darwin from Elston Hall. In the literature of legend the county has Gotham (*q.v.*), and Sherwood Forest, background to tales of Robin Hood, and also to the ballad of The King and the Miller of Mansfield.

Nottinghamshire and Derbyshire Regiment, THE. Official name of the regt. better known as The Sherwood Foresters (*q.v.*).

Nottingham University. See N.V. section, at end of Vol. 10.

Notting Hill. London district. Part of the bor. of Kensington, it is N. of Holland Park, with Bayswater to E. and Shepherd's Bush to W. At Notting Hill Gate was an old turnpike, removed in 1864; near the Met. rly. station is the Coronet Theatre, built 1898, later a cinema. On the rising ground of Ladbroke Grove, known in 1820 as Notting Hill Farm, is S. John's church, 1842-45. The farm was succeeded, 1837-41, by a racecourse, recalled by the name of Hippodrome Place. The district, built over 1828-48, was named from the manor of Knotting or Nutting Barnes, owned by John de Vere, earl of Oxford in the time of Edward IV.

Nouméa. Capital of the French island of New Caledonia. Situated on a bay in the extreme S., it engages in smelting and treatment of nickel ore. The Collège La Pérouse is one of the principal educational institutions in the Pacific. Nouméa is connected with Sydney, N.S.W., by monthly

steamer service. In the Second Great War, New Caledonia having declared for Gen. de Gaulle, British and U.S. aircraft carriers were based on Nouméa during operations against Japanese-held islands. Pop. 10,466.

Noumenon (Gr. *noumenon*, anything thought). Object of pure thought, opposed to phenomenon, the object of sensation. Kant further distinguishes the object known by the mind from the noumenon, which can be conceived but not known. The object is relative to intelligence generally; the noumenon is relative to nothing—it is the thing-in-itself, not the thing as we see it. *Pron.* No-oomenon.

Noun (Lat. *nomen*, name). In grammar, a word denoting a person or thing (noun substantive), or a quality (noun adjective). The term substantive (*substantivus*, self-existent) is due to the grammarians of the Middle Ages. Nouns substantive may be divided into abstract, expressing an attribute of a person or thing (virtue, beauty); concrete, designating real persons or things, to which such attributes belong; concrete nouns being further divided into proper, distinguishing any particular living being or inanimate object from others of the same kind (Henry, London); common, embracing all persons or things belonging to the same class (man, dog, house); collective, designating a collection of persons or things regarded as forming a whole (army, multitude, heap); partitive, indicating a part, variable in amount, of a collective whole. *See* Name.

Nova. (Lat. *novus*, new.) A temporary star noticed when a previously faint star blazes up in two or three days to a brightness usually between 10,000 and 1,000,000 times its value before the outburst. Since the star has usually been below visibility to the naked eye, it suddenly appears to the observer as a "new" star, hence the name. Its decline from maximum brightness is not so rapid as its rise, but within a few weeks the average nova has faded to about one hundredth of its maximum light and is probably again invisible to the unaided eye. A year or two afterwards the star has returned to insignificance, which suggests the outburst, though spectacular, is not deep-seated.

The brightest recorded novae are Nova Cassiopeiae, discovered by Tycho Brahe in 1572, which became brighter even than Venus and was visible in broad daylight; Nova Ophiuchi, discovered by

Kepler in 1604, which reached Jupiter's brightness; and Nova Aquilae, 1918, which exceeded in brightness all stars except Sirius. Nova Herculis in 1934 reached the first magnitude, and Nova Puppis in 1942 was as bright. Nearly 100 novae have been discovered since 1900, but most were invisible to the naked eye.

Novae generally appear in or near the Milky Way. This indicates that they are members of the galactic system which are so bright intrinsically that they can be seen at great distances. Study of novae appearing in other galaxies (*e.g.* the Andromeda nebula) suggests that they equal the brightest ordinary stars.

Some idea of the physical processes occurring during nova outbursts can be obtained from their spectra, which show at successive stages different features rarely matched by ordinary stars. The occurrence first of absorption lines and later of emission lines displaced (*see* Doppler's Principle) by amounts corresponding to velocities of approach of thousands of miles per second suggests that the outer envelope of the star is blown off by some catastrophic explosion as a succession of gaseous shells. Nebulous envelopes have been seen telescopically around some novae after the outburst. These rapidly attenuate as they expand, and give rise to a nebular spectrum (*see* Nebulium) typical of gases at low pressure illuminated by a central star at very high temperature. After months or years the gaseous envelope becomes too thin to radiate and the central star giving an ordinary stellar spectrum remains. A. Hunter, Ph.D., F.R.A.S.

Novaculite (Lat. *novacula*, razor). In geology, name given to a fine-grained rock consisting of small quartz particles. Several varieties are used as hones.

Novaia Zemlia or NOVAIA ZEMLYA. Archipelago of the Arctic Ocean, belonging to the U.S.S.R. It stretches N.N.E. between Barents Sea on the W. and Kara Sea on the E., and is separated from Waigats or Vaigach Island by Burroughs Strait. It is composed mainly of two large islands, divided by the Matochkin Shar or Matthew Strait; that to the S. is called Goose Land (*q.v.*), while the N. island is divided into Barents Land in the N., Lutkes Land in the centre, and Matthews Land in the S. Several small islands, mainly off the E. coast, combine to make the archipelago. The total land area is est. at 35,150 sq. m.

Novalis. Pseudonym of Friedrich Ludwig von Hardenberg (1772-1801), German writer. He was born May 2, 1772, at Wiederstedt, Prussia, and studied philosophy at Jena and law at Leipzig and Wittenberg, where he graduated in 1794. He fell in love with the beautiful Sophie von Kühn, whose death in 1797, at the age of 15, proved a great blow to him. In 1800 he was at Freiburg, studying mineralogy, when pulmonary consumption declared itself, and he died at Weissenfels, March 25, 1801.

His *Hymns to the Night*, 1800, written after he lost his betrothed, breathe a lofty spirituality. Apart from romantic philosophical fragments and those hymns, his chief work is a great unfinished romance, *Heinrich von Ofterdingen*, in which the symbolism of the pursuit of the blue flower by the hero is an interesting precursor of Maeterlinck's *Blue Bird*. His works were edited by L. Tieck and F. Schlegel, 1802, and his correspondence was published in 1880. *Consult Miscellaneous Essays*, T. Carlyle, vol. 2, 1829.

Novara. Frontier prov. of Italy, in Piedmont. It is bounded N. by Switzerland, W. by Vercelli prov., S. and E. by Lombardy. Its area is 2,548 sq. m.

Novara. City of Italy, capital of the prov. of Novara. Situated on an eminence between the rivers Terdoppio and Agogna, it is a junction 31 m. by rly. W. of Milan. Among its many handsome edifices are the Romanesque cathedral, dating from the 4th century, with a 10th century baptistery and old frescoes; the church of San Gaudenzio, founded in the 5th century and rebuilt in 1570; an ancient citadel, now used as a prison; and a museum with Roman antiquities. Rectangular streets recall the Roman occupation of Novara. Its old fortifications have been replaced by boulevards. The chief industry is the manufacture of textiles. Pop. (1936), 62,570.

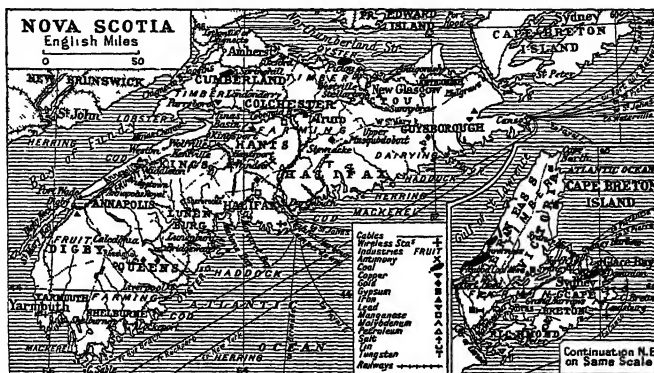


Novara, Italy. Dome of S. Gaudenzio, 397 ft. high, and part of the cathedral, right centre

Novara, BATTLE OF. Austrian victory over the Piedmontese, March 23, 1849. The armistice which followed the Austrian victory of Custoza, 1848, was succeeded by protracted and futile negotiations between England, France, Austria, and Piedmont. Wearied of a state of affairs in

lakes in Cape Breton. Many small islands lie off the coast.

Halifax is the capital, the chief port, and the largest city. Sydney, on Cape Breton, a mining centre, is the next in size, and third comes Glace Bay. The affairs of Nova Scotia are managed by a ministry responsible to the house



Nova Scotia. Map of this Canadian maritime province. Halifax is the winter port of entry from the Atlantic

which the only certainty was the daily strengthening of Austria, Charles Albert of Piedmont denounced the armistice, March 12, 1849, whereupon Radetzky made a rapid march and attacked him at Novara. Charles Albert's defeat was so overwhelming that he abdicated in favour of his son, Victor Emmanuel II.

Nova Scotia. One of the three maritime provinces of Canada. Its area is 21,068 sq. m., of which 325 sq. m. are water, and its pop. is est. at 612,000. The province consists of two parts. The larger is the peninsula of Nova Scotia, surrounded by the sea except where the isthmus of Chignecto, 11½ m. wide, unites it to New Brunswick. The smaller is the island of Cape Breton to the N., the strait of Canso lying between the two. The coast is very indented and has many openings, Minas Basin being the deepest. Halifax and Sydney have the finest harbours. There are a number of lakes, including Rossignol in Nova Scotia, and the Bras d'Or

of assembly, of 30 members, who are elected every five years. The province sends 10 members to the senate and 12 to the house of commons of the dominion. Its second chamber, or legislative council, was abolished in 1928.

Nova Scotia is mainly an agricultural area. Dairy produce, poultry, and fruit are the chief products, the apples of the fertile Annapolis valley being famous. Oats and potatoes are also largely grown. There is a good deal of forest land and much timber is felled. Cape Breton has a rich coal-field, and in Nova Scotia coal, iron, gold, salt, and gypsum are worked. The fisheries are valuable, chief among them being cod, lobster, and mackerel; trout and salmon are caught in the rivers. The rlys. converge on Halifax.

Nova Scotia was first taken possession of by the French, who named it Acadia. In 1613 the French settlers were ousted by the English, and in 1621 James I bestowed it upon a Scotsman, Sir William Alexander, to which fact it owes its name (New Scotland). It was given back to France in 1632, and again in 1667, after it had been taken by Cromwell. Port Royal, the later Annapolis, was then the capital of the colony.

The long struggle between England and France for the possession of America was partly fought out here; in 1710 Great Britain again seized Nova Scotia, keeping it by the treaty of 1713, but Cape Breton



Nova Scotia arms

remained French. At this time Nova Scotia included New Brunswick and Prince Edward Island, although its W. boundary was uncertain. On Cape Breton the French built the strong fortress of Louisbourg, which was twice captured by the British. In 1748 it was restored, but the second time it, and with it Cape Breton, was retained, and it formally became British in 1763.

From Nova Scotia itself the British in 1755 had expelled the French settlers, known as Acadians, and during the Seven Years' War the French vainly attempted to recover the region. After the British victory in 1763 New Brunswick and Prince Edward Island were separated from the colony.

In 1867 Nova Scotia was one of the four provs. composing the new dominion of Canada. It had had representative institutions since 1758, but their corollary, responsible government, was secured only about this time. The union once effected, there was soon a strong agitation for withdrawal, but financial concessions were made, the Inter-colonial rly., part of the bargain, was completed, and the movement gradually died away. Woman franchise was passed into law in 1918.

Novatianism. Schism which arose in the Christian Church in the 3rd century. It was named after Novatian, a presbyter of Rome, who was joined by Novatus of Carthage. Its adherents called themselves Cathari (*q.v.*) and separated from the Church as a protest against the laxity of the Roman clergy in receiving the lapsed to penance. Novatian is described as the first anti-pope, and he instituted a succession of schismatic bishops which existed for nearly 300 years. The Novatians denied that the Church could reconcile those who had fallen after baptism into deadly sin; they rebaptized those who joined them.

Novation (Lat. *novatio*, making new). In law, the substitution of one legal obligation for another. The situation constantly arises in the case of a change of partners in a firm. Thus if A and B are partners, under the title of A and Co., and have dealings with X, and B retires from the firm and C comes into it; and X, with knowledge of the change, goes on dealing with A and Co., he is deemed to accept A and C as his debtors (or creditors) instead of A and B.

Novaya Zemlya. Arctic archipelago of which the alternative spelling is Novaia Zemlia (*q.v.*).

THE NOVEL: ITS HISTORY AND RANGE

Frank Swinnerton, distinguished Novelist and Critic

The development of the art of reflecting life through imaginative fiction is here clearly presented, from the earliest travellers' tales to the contemporary excursions into unlimited subjectivity. See also English (Language and) Literature; Short Story; and under the sub-heading Literature in the articles on various countries, e.g. France, Germany, Hungary, Iceland, Russia, etc.

As soon as men began to narrate their adventures, and, for the better understanding of audiences, to arrange them in dramatic sequence, the novel was born. Only the types of adventures, and the degrees of emphasis in the narration, varied in the following centuries; and the earliest romances known to us are, in essence, travellers' tales. In these, love, magic, extraordinary accident, supposed death, and capture by and escape from pirates, are succeeded by eventful wanderings in strange countries, hardships, dangers, reunions, feasts, and happiness. Such stories mirrored the hopes and fears of listeners, excited their wondering curiosity, and pictured for them a wider, more enthralling world than the one they knew.

Adventures of "He" and "She"

In the early centuries of the Christian era, when the satiric Golden Ass, the charming pastoral Daphnis and Chloe, and the elegant and ingenious Theagenes and Chariclea of Heliodorus were composed, almost anything could happen in that unexplored world. Intercourse between communities was small, and credulity was eager. Story-tellers therefore enjoyed a freedom which modern authors cannot hope for, and gloried in the invention of all that seemed to them extraordinary. They discovered, however, one fact which later novelists have confirmed. It was that those who listened wanted to hear, not about great armies or undertakings, but about individuals, "he" or "she," who might be themselves or their idealised loves. Whether they were shepherds and shepherdesses, or distracted pilgrims, or, as the age of chivalry approached and was realized, knights and their ladies, they were henceforward "he" and "she," the prototypes of all later heroes and heroines of romance.

The whole of Europe gradually shared in such stories, which were carried from one land to another by minstrels and tale-tellers; and to this day, although students alone read the actual narratives sung or recited throughout the Middle Ages, we all know the

chivalric legends garnered by Geoffrey of Monmouth and, much later, Sir Thomas Malory. Daphnis, Chariclea, Hysmene, and Callirrhoe became Charlemagne, Arthur, Gawain, Galahad, and at length Tristram, Guinevere, Lancelot, and Yseult. In Scandinavia their ordeals were grimmer, in the Orient more ghastly; but, whatever names the heroes bore, all were splendid puppets, to be lauded to simple audiences, loving, feasting, fighting against men and magic, and wandering, sometimes upon mighty quests, in a largely unpopulated world.

What Saintsbury called "the pure novel" did not begin to be written until much later; yet it was on the way. By the 14th century narrative had been sharpened by the sly cruelties of Boccaccio and his imitators (Italy had no romances of chivalry), and by the 16th it had been enriched by the monstrous humorous extravagance of Rabelais. And although a largely bogus heroic romance reached immense popularity in Spain, and the *Arcadia* was written to universal admiration late in the 16th century by our own Sir Philip Sidney, this older type of romance lost its hold as the conditions in which it thrived yielded to the effects of the Renaissance. To the knight had succeeded the adventurer. The rogue appeared in Spanish literature. And at last came the greatest knight of all, in whose veins, for the first time in fiction, ran perceptible warmth. With Don Quixote we do indeed approach Saintsbury's "pure novel," a tale "confining itself to the incidents of ordinary life; advancing character to a position at least equal with plot; presenting the manners of its own day, but charging them with the essence of humanity in all days."

Progressing towards Realism

Henceforward, with hesitations and long periods of sterility, the story of the novel, as distinct from the romance, can be told as one of progress from the improbable to the real, from the flatly external to the limitlessly subjective. Don Quixote was the example from which English

masculine novelists of the 18th and 19th centuries learned to regard men and women as moral beings with an important relation to the society in which they lived. It thus had an influence which we still feel. Two French novels which similarly may be said to have created the feminine novel, or story of sensibility, were Mme. de La Fayette's brief study of motive and emotion, delicacy, and temperament, *La Princesse de Clèves*, which presented the now familiar "triangle," and the analytical *Vie de Marianne*, of Mariyvaux. These two books lead us directly to Samuel Richardson, whose close pictures of women were once called excursions into "imaginative ethics," and by way of Richardson to all those writers who have since specialised in the human heart.

Objective Realism

A third element now appeared in fiction: objective realism, the scrupulous imitation of fact. Defoe, its inventor, was an experienced journalist with a remarkable gift for detail; and after recording his observations as traveller and spy for nearly sixty years he brought the gift to fiction with overwhelming effect. Thus by 1719, when Robinson Crusoe was published, the novel had been granted humorous and critical humaneness, sensibility, and realism. It was largely dominated by these characteristics, in England, for a hundred years; and, allowing for inevitable changes in manners and literary style, one may find the same characteristics in the great Victorian novels and in books as late as *The Old Wives' Tale*, 1908, and *The Good Companions*, 1929. "A novel," said Smollett, halfway through the 18th century, "is a large diffused picture, comprehending the characters of life, disposed in different groups and exhibited in various attitudes, for the purposes of a uniform plan."

No such definition would have covered the French novel of the same period, although both Fielding and Smollett were certainly acquainted with *Gil Blas* and *Le Diable Boiteux*. On the whole the French novel of the 18th century, by comparison with what was being written in England, was dedicated. But wit, a first demonstration of psychological analysis, and at least some sense of truth and proportion are revealed, and Prévost in one tiny masterpiece, *Manon Lescaut*, and Rousseau in the first portion of *La*

Nouvelle Héloïse, allowed themselves something which their English contemporaries were denied. This was passion.

Nor were the large-scale realists unchallenged in England. Sterne caught inspiration flying and threw off a few dazzling characters; Horace Walpole and Mrs. Radcliffe, perhaps by reaction from the rationalism of their century, made magic of ruined castles, dungeons, and the supernatural in what they called "Gothic romance." And, while Sterne had a doubtful progeny of sentimentalists, sham Gothic, the favourite "horrid" reading of young ladies, led in time to, and was transcended by, the Scotch novels (as they were called) of Sir Walter Scott. Scott, an antiquary, is inexact called an historical novelist, and of late has been underrated. His greatest novels, which described almost contemporary life, brought to prose fiction, for the first time, an Elizabethan grandeur of comedy and tragedy. At his best he is comparable in creative power to Shakespeare; and his liberating influence upon all imaginative prose literature cannot be exaggerated.

By contrast with the Scotch novels, those of Jane Austen, written about country house and village life at the very end of the 18th century, are occasionally thought to be amusing parochial satires on snobs, schemers, and silly young women. The delight they give, however, is endless. They grow new delicious chapters, and the characters in them reveal new profundities of understanding, at every reading. As comedies of life and manners they are unique.

Zenith of the English Novel

The supreme days of the English novel had now been reached; and in the year of Queen Victoria's accession, Charles Dickens published *The Posthumous Papers of the Pickwick Club*, in which, to the roving manner of the traditional romance, he added uproarious merriment, satire, severe social criticism, and a greater capacity than Fielding's or Smollett's for the invention of droll minor personages. The book, with its sequels, made the novel universal family reading, and spread here and abroad, especially to France and Russia, such new inspiration as had been carried previously only by Cervantes, Richardson, and Scott.

Dickens loved melodrama; he could not resist his own comic

exuberance, and his pathos has lost its effect. But he had astounding creative energy. It far surpassed that of his distinguished contemporaries, who, shrinking appalled from his vulgarity, refined, deepened, and broadened the scope of good-humoured fiction until, with Thackeray, it embraced the genteel world, with Trollope the broad counties, with George Eliot the very spirit of altruistic rationalism, and with half a dozen others (not more effective than Dickens in arousing the moral sense of a people) the sufferings and social anomalies of an increasingly industrialised society. In England, for almost the whole of the 19th century, the novel was the most powerful instrument of ethics which had been invented by man. It was full of engrossing story and generously conceived characters; but except for the Brontë sisters, it was not impassioned, and, except for Jane Austen, it was not a precise and delicate work of art.

The French Masters

The English novelists, in fact, were instinctive novelists. They brought to their work genius, intellect, and inexhaustible love of humanity. They had hardly at all grasped the notion that there could be something classifiable as "the novel." This was partly true even of the two last great Victorians, Meredith and Hardy, who both, however, dramatised life; the one, after the manner of the Restoration playwrights, as comedy, the other, following the greatest Elizabethans, as tragedy. It was much less true of the majestic Frenchmen, Beyle and Balzac, of whom the former brought cold analysis of vice and virtue, action and emotion, to a degree previously unattempted, while the latter conceived the scheme of incorporating all life—spirit, flesh, work, wealth, and misery—in a series of novels which he afterwards called *La Comédie Humaine*. These two men were the first modern novelists. From what they wrote, almost the whole of French fiction arose. But where Balzac spun from within himself a fabulous France, Zola drew more precisely from observation and blue book, and still later Jules Romains and other social historians have taken what are called cross-sections of life. Where Stendhal (Beyle) coolly watched heartless lovers, Flaubert calmly portrayed wantons and romantics.

The differences were those of art, age, and environment; the resemblance was racial. The French are realists. In creative literature they love type and form. To the French above all, therefore, we owe the development of novel-writing as an art.

To say this is not to deny the creative supremacy of the Russian novelists, who had a power, breadth, and passion unknown in other literatures. They, more than the French, learned from Dickens; and the debt is apparent in both Gogol and Dostoevsky. But Dostoevsky, who was once scornfully described by George Moore as "Gaboriau with psychological sauce," learned from Dickens only a large looseness of construction. His temperament and his terrible experience as a man condemned to death and reprieved carried him to vehement heights and depths of emotion which Dickens could never have shared. His religious fervour, and the hyperaesthesia which gave him such insight into the minds and hearts of anguished people, could have had no place in English fiction, where the only writer to approach him for intensity of feeling was D. H. Lawrence, or even in American fiction, despite the apocalyptic splendours of Herman Melville. Moreover, the grand range of the Russian novel, sensational in Dostoevsky, but in Tolstoy's *War and Peace* impressively restrained, puts it beyond all comparison.

This question of size and conception does not arise in the case of Turgenyev, the third of the greatest Russian novelists, because Turgenyev has not the tumult of Dostoevsky nor the cosmic imposingness of Tolstoy's *War and Peace*. He was an artist in the French sense; his books are short, subdued, poignant in their revelations of sorrow and frustration. Although there are differences in quality as in theme, Turgenyev had as followers both Henry James and the early Galsworthy. Like them, he devoted himself to the drama of character, to the interaction of a small group of people of sensitive breeding; like them, he relied, as Joseph Conrad did, upon the significant word and gesture to convey every feeling and in particular every suffering of his very subtly seen characters.

James and Conrad did this, the one in delicate easel-dramas, the other in beautiful or dramatic pictures of failure and conflict. Proust, in France, expanded what

James refrained from expanding: he did not bring crisis to the easel, but with enchanting sensitiveness and taste he gave to the novel what James reserved for his autobiographical books, *A Small Boy*, and *Notes of a Son and Brother*. But Proust offered a lead—no more—to other writers who wove their reveries into a kind of novel known as "the stream of consciousness." At a time when realism was in eclipse, these writers brought fiction farthest from its beginnings. They looked within. For the external flatness of classical romance, and the humorous jog-trot of the popular chronicle, the world-changing improvisations of H. G. Wells, and the searching pateries of Arnold Bennett, they substituted poetic fantasy and what may be called the egotistic destructive. The novel had reached the subconscious. We do not yet know where it will go next. See English Language and Literature; Language and Literature subsections under the headings of Belgium, France, Germany, etc.; Dickens; Hardy; Meredith; Scott; Thackeray, etc.

Novello, IVOR (b. 1893). British actor, dramatist, and composer. Son of Clara Novello Davies, he was born at Cardiff, Jan. 15, 1893, and educated at Magdalen College school, Oxford, making his début on the stage in Deburau at the Ambassadors', 1921. He was already famous for his song of the First Great War, *Keep the Home Fires Burning*. As a romantic actor he had a great following in his own musical plays and light comedies. The first plays to achieve success, *The Rat*, 1924, and *The Truth Game*, 1928, were written in collaboration with Constance Collier; *Symphony in Two Flats* followed in 1929, and *Fresh Fields* in 1933. His series of musical plays began with *Glamorous Night*, 1935, followed by *Careless Rapture*, *Crest of the Wave*, *The Dancing Years* (filmed 1950), *Perchance to Dream*, and *King's Rhapsody*.

Novello, VINCENT (1781-1861). British composer. Born in London, Sept. 6, 1781, of mixed Italian and English parentage, he became a chorister in the Sardinian Chapel and later an organ-

ist. He died Aug. 11, 1861. He was a founder of the London Philharmonic Society, composed church music, masses, etc., and edited collections of sacred music. The publication of these by himself was the beginning of the business of Novello and Co., actually founded, 1861, by his son Joseph (1810-96).



V. Novello.

After Sir E. P. Novello

November. Eleventh month of the Christian calendar, the ninth in the old Roman calendar, whence its name from Lat. *novem*, nine. The Anglo-Saxons called it *Wind-monath*, and also *Blód-monath* (blood month), from the practice of slaughtering cattle during this month, to be salted for the winter. See Calendar.

Noverre, JEAN GEORGES (1727-1810). French choreographer. Born in Paris, March 29, 1727, he composed his first ballet for the Opéra Comique in 1747, and later devised the choreography for works by Gluck. He was invited to London by Garrick in 1755, though his influence was greatest at Stuttgart. Noverre's celebrated *Lettres sur la Danse*, 1758, did much to free the art of ballet from conventions. He was ballet master at the Paris Opéra, 1775-89. He died Nov. 19, 1810. See Ballet.

Novgorod. A town of the R.S.F.S.R. It is sometimes given the prefix *Veliki* (great), and is not to be confounded with the former *Nijni Novgorod*, now Gorky. It stands on the river Volkhov, N. of Lake Ilmen and 100 m. S.S.E. of Leningrad. Here are a kremlin or citadel, the cathedral of S. Sophia, the palace of Catherine II, and a monument commemorating the expulsion of the French in 1812. There are tanneries and candle works, and a trade in grain, timber, salt, and iron. In 862 Novgorod was the capital of the Scandinavian chief Rurik (*q.v.*), and it remained the Russian capital until replaced by Kiev. In the 12th century, when it was the centre of a great republic, the pop. grew to 400,000; but it came into the power of Moscow, and was almost destroyed by Ivan the Terrible in 1570. Standing on the main Leningrad-Moscow rly., it was a key city in German attacks on Leningrad during the Second Great War. Von Leeb's right



Ivor Novello,
British actor

wing took it on Aug. 21, 1941. It remained in German hands until on Jan. 20, 1944, the Red Army recaptured it by storm after an out-flanking movement. Pop. 31,120.

Novi or **Novi LIGURE**. Town of Italy, in the prov. of Alessandria, Piedmont. It is a junction 14 m. by rly. S.E. of Alessandria. Silk weaving is the chief industry. Here on Aug. 15, 1799, the combined Russians and Austrians defeated the French, who lost their general, Joubert, and 10,000 men. The French were victorious in the same locality on Nov. 6. Pop. 18,000.

Novi Pazar, **Novi Bazar**, or **YENIPASAR**. Town of Yugoslavia, in S.W. Serbia. Situated on the Rashka, a tributary of the Ibar, it is about 130 m. due S. of Belgrade, and is strategically important as a road junction. It frequently figured in Serbian history in the Middle Ages. Under the Turks it was fortified, and the chief town of the sanjak of Novi Pazar, part of the vilayet of Kossovo. After the treaty of Berlin, 1878, the sanjak was garrisoned by Austrian troops, and held until 1908, when Austria annexed Bosnia-Herzegovina, but retired from the sanjak. During the first Balkan War the town and sanjak were occupied by the Serbo-Montenegrins, and as the result of these two wars the sanjak was divided between Serbia and Montenegro in 1913.

Novi Sad (Ger. Neusatz; Mag. Ujvidem). Town of Yugoslavia, capital of the prov. of Dunavska. It is about 42 m. by rly. N.W. of Belgrade. Founded in the middle of the 18th century, it was almost completely destroyed during the revolution of 1848-49 but grew later into a prosperous town with a cathedral, the seat of a Greek Orthodox bishop. Pottery and cotton goods are produced, and there is a large airport. Novi Sad, occupied by Hungarian troops, 1941, was liberated by Tito's partisans, Oct. 25, 1944. Pop. 63,985.

Novocaine. Local anaesthetic. A para-aminobenzoylethyl-diethyl-amino-ethanol hydrochloride, it is included in the British Pharmacopoeia under the name of procaine hydrochloride. Novocaine is used in surgery in a similar manner to cocaine, but is more stable in solution, less toxic, and does not cause addiction. It is employed in the form of a 0.1 p.c. solution in infiltration anaesthesia, and as a 2 p.c. solution in conduction anaesthesia. See Anaesthesia.

Novocherkassk. Town of the R.S.F.S.R., in the Azov-Black Sea area, formerly the capital of Don

Cossack territory. On the rly. 25 m. N.E. of Rostov, it trades in anthracite, timber, corn, and wine. Pop., pre-war, 31,286.

Novorossiisk. Town and seaport of the R.S.F.S.R., in the Azov-Black Sea area. Standing on the Black Sea 60 m. W.S.W. of Krasnodar, it is connected by rly. with Rostov and Baku. Its formerly large export trade in grain has been mostly superseded by the shipping of petroleum and cement. During the Second Great War it became an important base for the Russian Black Sea fleet after the fall of Nikolayev, but was captured by the Germans, Sept. 5-11, 1942. Russian forces retook it after five days' violent street fighting, Sept. 16, 1943. Pop. 95,280.

Novosibirsk. Capital of the W. Siberian region of the R.S.F.S.R. This was a village of 5,000 people in 1900, and in 1939 an industrial city of 405,589. In the Ural area, it has light metal factories and trades in cereals and sugar beet from the steppe lying W. It is a rly. junction for Omsk, Tomsk, and Barnaul. The first theatre to be built for opera and ballet in W. Siberia seats 2,000.

Nowgong. Town and former cantonment of the Vindhya union, India. The town lies W. of Chhatarpur. Rajkumar College, for the education of the sons of Indian chiefs, founded by the chiefs of Bundelkhand in memory of Lord Mayo, was opened in 1875. Pop. 6,000.

Nowgong. Dist. and town of Assam. The dist. lies S. of the Brahmaputra. Although almost the whole area is cultivable, less than one-tenth is tilled, rice and oil seeds being the chief crops. The town is on the Kalang, a left-bank tributary of the Brahmaputra. The area of the dist. is 3,898 sq. m. Pop. dist., 710,800; town, 5,400.

Noya. Town of Spain, in the prov. of Corunna. It stands at the mouth of Tambre river at the head of Muros y Noya Bay, 21 m. W. of Santiago de Compostela. Ship-building and fishing are the leading occupations, and there are manufactures of lace, linen, soap, and paper. Pop. 11,800.

Noyau (Fr., kernel). Liqueur made from the kernels of peach-stones or bitter almonds, brandy, and sugar. Either white or pink, it is a cordial and used for flavouring in cookery. It is made in Martinique, and exported from Bordeaux.

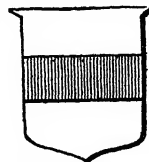
Noyes, ALFRED (b. 1880). British poet. Born in Staffs., Sept. 16, 1880, he was educated at Exeter

College, Oxford, and published his first book of verse, *The Loom of Years*, in 1902. He wrote lyrics notable for their easy, flowing resonance, several being set to music by Elgar and other composers. His *Tale of Old Japan* was arranged as a cantata by Coleridge-Taylor. Early volumes included *Drake*, 1906; *Forty Singing Seamen*, 1907; *The Enchanted Isle*, 1909. A poetic drama, *Robin Hood*, was produced in 1927; *Ballads and Poems* appeared in 1928; an epic poem on science, *The Torchbearers*, was issued in one vol. in 1937. Noyes also wrote *The Return of the Scarecrow* (novel), 1929; *The Unknown God* (philosophy), 1934; a study of Voltaire, 1936; *The Edge of the Abyss*, 1944. He was visiting professor of English literature at Princeton university 1914-23.



Alfred Noyes,
British poet

Noyon. French town, in the Oise department. On the Brussels-Paris rly., it is 67 m. N.E. of the capital. It is famous as the birth-place of Calvin; for a treaty between Francis I and the future emperor Charles V in 1516; and for its cathedral destroyed in the First Great War. This had been founded by Pepin the Short c. 760, and in parts remained unfinished; rebuilt after 1920, it suffered minor damage in the Second Great War. In Roman times known as Noviomagus, Noyon was a bishopric from 531 to 1790, and for some time a royal residence of the Franks. Twice in German hands during 1914-18, it was the scene of fighting in 1940 and 1944. Important as an agricultural centre, Noyon is known to English readers from Stevenson's *An Inland Voyage*. Pop. 7,306.



Noyon arms

Nuba. Negro people, mostly in the Dar Nuba region of the Nuba Mountains prov., Sudan. Dark, woolly-haired, stoutly built, and muscular, they are an aboriginal stock, and have been driven into the hills by Baggara and other Sudanese "Arabs" of the plains. Mostly unclad, their personal ornamentation—lip-plugs, tooth-mutilation, and scar-tattooing—

attests cultural relationship with the Nilotic negroes. *See* Africa; Negro. *Consult* The Nuba, S. F. Nadel, 1947.

Nuba. Range of mountains in Kordofan. It contains the districts of Dilling, Sungkai, Kadugli, Rashad, Tagelle, Talodi, and Eleri. The capital is Talodi. Area, 32,200 sq. m. Nuba is also the name of a prov. in the Anglo-Egyptian Sudan.

Nubia. Name formerly applied to a large region of N. Africa extending on both sides of the Nile from Egypt to Abyssinia, now more generally called the Anglo-Egyptian Sudan. Nubia formed part of the ancient kingdom of Ethiopia, and was divided into Nubia Proper or Lower Nubia, extending from near Assuan to Dongola, and Upper Nubia, extending to and including parts of the Equatorial provs. *See* Africa; Ethiopia; Sudan.

Nuble. Inland prov. of Central Chile. Sloping from the Andes to Concepción, it is level and fertile in the W., and produces wheat, cattle, and timber. The vine is cultivated, and an excellent wine made. The capital is Chillán. Its area is 5,485 sq. m. Pop. 243,185.

Nucellus. Botanical term applied to the tissue which constitutes the main body of a young ovule. It is homologous with a megasporangium wall, for within it the nucleus of a specially prominent cell undergoes meiosis to initiate female gametophytic structures. Around it there grow up one or two tissue layers which become the integument(s) of the ovule. The nucellus may be a bulky tissue, as it is in most gymnosperms and some angiosperms, e.g. dock, caltha, tulip, or it may consist of a few cells—even of one cell layer only.

Nuclear Fission. Term in physics properly confined to those cases of "atom splitting" in which a heavy nucleus divides into two fragments of approximately equal size; each of these becomes the nucleus of a new atom occupying a mid position in the periodic table. It was produced by Hahn and Strassman in 1939 by the neutron bombardment of uranium, but it can be artificially induced by other kinds of bombardment, and it also occurs naturally. The process releases nuclear energy of the order of about 200 MeV, and is usually accompanied by the emission of several neutrons. In certain circumstances (e.g. with uranium 235 or plutonium, in sufficient quantity), these secondary neutrons can

produce fission in neighbouring nuclei, and the process can grow into an atomic explosion. In other cases (e.g. with uranium 238, thorium, or protactinium), where the energy of most of the secondary neutrons is not sufficient to provoke fission in neighbouring nuclei, the reaction rapidly dies out. *See* Atom. *Consult* Applied Atomic Power, Smith and Fox, 1947.

Nuclear Physics. Branch of physics concerned with the properties of the atomic nucleus. The subject of nuclear physics attracted much attention immediately after the Second Great War because of the advances made in the development of nuclear energy (usually termed, though not strictly correctly, atomic energy). The problem is, however, the contemporary aspect of one which has attracted investigators for centuries, i.e. the transmutation of the elements. The study of transmutation is obviously concerned with the structure of the atom and in particular the nucleus, but it was not until Rutherford's experiments in 1911 that direct experimental evidence of artificial transmutation was provided. Rutherford allowed fast-moving charged helium atoms, known as alpha (α) particles and emitted by certain radio-active materials, to fall on thin sheets of gold, aluminium, etc. From observations on the scattering of these α particles he deduced that the atoms of the metals comprised small but massive centres, i.e., nuclei, which were charged electrically. He further established that the gold nucleus carried a larger electric charge than that of aluminium (*see* Atom).

The liberation of the various radiations (α , β , and γ) from a naturally radio-active substance are due to the disintegration of the atoms of their own accord; energy is released at the same time, but the process is an uncontrollable one. Hence there arose the idea of producing an artificial source of bombarding particles to replace the natural radio-active one, and this led to the development of machines for producing high voltages. By such means charged particles can be accelerated to high velocities, so that they possess sufficient energy to disrupt atoms.

The detection of the various atomic particles is the other phase of nuclear physics which is of extreme importance. There are four main methods:

(a) The scintillation method (used by Rutherford in his early work) in which each particle gives

rise to a flash of light or scintillation on striking a zinc sulphide screen; (b) the electrical counting method, which depends upon the ionisation of a gas due to the collision of a gas molecule with a fast-moving charged particle which has entered the chamber containing the gas. Apparatus known as the Geiger counter contains two electrodes maintained at a sufficiently high electrical potential difference to produce a cumulative ionisation process, and the pulse of current thus produced by an incident particle can be suitably amplified to operate a counting mechanism; (c) the Wilson cloud chamber method which utilises a closed vessel containing air saturated with water-vapour so that the volume becomes supersaturated on the cooling produced by a sudden expansion of the volume of air by means of a piston. If an atomic particle has entered the chamber immediately before this expansion then its track will be made evident by the water drops formed on the ions which are produced in the path of the particle. By suitable synchronisation photographs can be taken which have often shown up sudden changes in the path direction, and so have enabled valuable deductions to be inferred regarding the nature of the collisions. Lastly, (d) the use of the photographic plate itself to detect the passage of atomic particles in their path through the emulsion.

R. W. B. Stephens, Ph.D

Nucleus (Lat., kernel). Biological term applied to that specially differentiated portion of the protoplasm of most animal and plant cells which contains a large proportion of the readily stainable material, chromatin. A nucleus is more or less rounded and is normally bounded by a delicate nuclear membrane, just within which is a net-like chromatin containing nuclear reticulum with one or more aggregations of chromatin called nucleoli attached. The residue of its volume is nuclear sap. The nucleus is essential for many of the cell's activities and bears many heritable characters. When cell division is pending the reticulum condenses to form rod-shaped chromosomes of which the number is constant for the type of organism.

Nucleus. In astronomy, the brightest part of the head of a comet. It usually appears only when the comet is near the sun.

Nucleus. In physics, term for the central core of the atom (*q.v.*), around which planetary electrons revolve. *See* Nuclear Physics.

Nudism. The practice of sunbathing, swimming, and playing outdoor games without clothes. Nudist clubs probably started in pre-Nazi Germany, and developed slowly in Great Britain, although the movement was given an impetus by warm summers in 1933-35 and showed signs of recruiting newcomers after the Second Great War. Those who practise nudism in clubs where both sexes and all ages mingle together out of doors claim that they derive, apart from the obvious physical benefit of sunlight, a mental freshening from the absence of restraint and pose in conversation and the abeyance of social and professional distinctions.

Nueces. River of Texas, U.S.A. Rising in Edwards co., in the S. of the state, it flows 315 m. S. and S.E. to Corpus Christi Bay, in the Gulf of Mexico. It drains an area of nearly 19,000 sq. m., and provides much water for irrigation.

Nuée Ardente (Fr., glowing cloud). Cloud caused by the explosion or sudden frothing of gas-charged lava escaping from a volcano while under great pressure. The mixture of burning and expanding gas and hot pumice fragments forms a great cauliflower type cloud which, because of the solid material it contains, is heavy and so avalanches down the side of the volcano. On May 8, 1902, the city of St. Pierre, capital of Martinique, was totally destroyed with 30,000 inhabitants by such a cloud from Mt. Pelée. They are not always glowing; some are black, as was observed at St. Vincent on May 6, 1902, when some 1,600 people were killed by a blast. Their temperature is high, sometimes over 700° C.; they move quickly; and the fact that the lava particles and fragments are emitting gas causes an internal air cushioning effect, and the cloud moves silently. See Pelée, Mont.; Volcano.

Nuer. Nilotic negro tribe, mostly in the Bahr-el-Ghazal prov., Sudan. Blue-black, 5 ft. 9 ins., located between the Shilluk and Dinka, they are flat-footed marsh-dwellers, using pile-houses, subsisting on fish and aquatic plants. The women pierce the upper lips.

Nueva Cáceres or NAGA. City of the Philippines, capital of the prov. of Ambos Camarines, Luzon. It is situated on the Naga river at the foot of Mt. Isarog, 145 m. in a straight line E.S.E. of Manila, and contains a cathedral, bishop's palace, and normal school.

Nueva Esparta. Insular state of N. Venezuela, on the Caribbean Sea. It includes Margarita and

adjacent islands, and its capital is La Asunción. There are important pearl fisheries. Area, 490 sq. m. Pop. 69,195. See Asunción, La; Margarita.

Nuevo Laredo. The main point of entry into N. Mexico from the U.S.A., connected by rly. and motor road with Mexico City (803 m.). Cattle and cotton are raised locally, and the town has several factories. Pop. 16,000.

Nuevo León. Interior northern state of Mexico. It lies partly on the slopes of the eastern Sierra Nevada and covers 25,134 sq. m. None of its many rivers is navigable for any distance. The soil yields sugar and cereals. Stock-raising is engaged in, and zinc, silver, and lead are mined. A rly. service radiates from Monterrey, the capital. Pop. 541,147.

Nuffield, WILLIAM RICHARD MORRIS, 1st VISCOUNT (b. 1877). British industrialist. Born at



Viscount Nuffield, British industrialist

Cowley, Oxfordshire, Oct. 10, 1877, he became an apprentice in a small cycle-shop in Oxford in 1894. He soon set up in business as a cycle manufacturer, and raced with machines of his own construction, winning seven county championships in 1900. From the manufacture of cycles he turned to that of motor-cycles, and in 1912 began the production of the Morris-Oxford light car, which achieved great popularity.

The business thrived during the First Great War, and after it Morris embarked on a large-scale scheme of mass production. His great organizing ability rapidly established Morris Motors, Ltd., as one of the largest car manufacturers in the U.K.; by 1926 the output had reached 100,000 cars a year. Morris widened his market by acquiring the Wolseley, M.G., Riley, and other companies. He was made a baronet in 1929, a baron in 1934, a viscount in 1938. His gifts to hospitals, to Oxford university, and to the Royal College of Surgeons, totalled several millions (see also Nuffield Foundation). During the Second Great War he organized Nuffield Centres for service men's welfare. In 1940 he was director-general of maintenance at the Air ministry.

Nuffield College. Graduate college of Oxford university, for the foundation of which Lord

Nuffield gave, in 1937, £1,000,000, including a site worth £100,000. The aim of the college is to promote cooperation between theoretical students and practical workers, to link research in social studies with the demands of everyday life. Its physical chemistry laboratory cost £100,000.

Nuffield Foundation. Trust fund set up by Lord Nuffield in Feb., 1943. Seven trustees were appointed, to whom Lord Nuffield handed over holdings in the Nuffield organization to the value of £10,000,000, directing that the interest be used for (1) medical research; (2) the organization and development of medical and health services; (3) scientific research and teaching in the interests of trade and industry; (4) the pursuit of social studies; and (5) the care and comfort of aged persons. The trust operates by grants to existing institutions.

Nuisance (Fr. *nuisance*, anything injurious). In English law, anything that does harm or causes inconvenience. Nuisances are classified as public and private. Public nuisances are of many kinds. There are nuisances which are injurious to the public health, such as having on one's property foul drains, sewers, and the like; these are dealt with under the Public Health Acts by the local authorities, who have power, in the last resort, to "abate" them at the expense of the owner or occupier of the property. Nuisances to highways consist of doing acts which cause obstruction to the roads. Nuisances to rivers and streams include polluting their waters or obstructing their flow.

Private nuisances are, or may be, somewhat different. A public nuisance may also be a private nuisance if it causes particular loss, damage, or inconvenience to one person more than it causes to the public generally. Thus, if a man next door to a shop erects an obstruction on the pathway, so that customers cannot enter the shop, it is a private nuisance to the owner as well as being a nuisance to the highway. The general principle of the law of nuisance is that a man shall not use his property so as to cause loss and damage to his neighbour. The remedy for private nuisance is by injunction and damages; and an action can be brought against anyone who continues the nuisance as well as against him who started it.

Nukualofa. Capital of the Friendly Islands. Situated on the N. coast of the island of Tongatabu.

it is connected by direct steamer service with New Zealand. There is a radio and cable station.

Nullity (Lat. *nullus*, none). The state of being null or void. In England the term is chiefly used in a legal sense. A nullity of marriage is a proceeding in the divorce court to declare a marriage null and void. See Divorce.

Numantia. Ancient stronghold of the Arevaci in N. Spain, on the Douro, near Soria. The centre of the struggle between the Romans and the Celtiberians from 154 to 133 B.C., it withstood several sieges and defeated a whole Roman army in 137. The garrison of some 6,000 to 8,000 Spaniards was eventually obliged to capitulate through starvation after a 15 months' siege (134-133 B.C.) by 60,000 men under Scipio Aemilianus. The Roman town of Numantia was afterwards built on the site.

Numa Pompilius. Second of the seven legendary kings of ancient Rome. He is reputed to have reigned from 715 to 673 B.C. A man of peace, instructed in sacred lore by the nymph Egeria (*q.v.*), he first established the priestly offices of the Roman state.

Number (Lat. *numerus*). In grammar, that attribute of a word which expresses unity or plurality. In addition to singular and plural, there was also a dual number, indicating that two persons or things were concerned. It survives in some Indo-European dialects and in the Semitic languages.

Number. The abstract ratio of one quantity to another of the same kind. The origin of numbers is lost in history, but the classification of numbers can be traced more definitely. An Egyptian papyrus dating from 1000 B.C. has a collection of problems dealing with fractional numbers. Pythagoras certainly understood polygonal numbers, factors, proportion, etc., and Euclid devoted four books to the subject. The names, etc., of numbers, such as trillion, are dealt with under Numeral.

Numbers may be classified under many heads, such as odd and even, prime and composite, rational and irrational. Odd numbers are 1, 3, 5, 7; even numbers 2, 4, 6; prime numbers those which have as factors themselves and unity; composite numbers those which admit of factorisation, *e.g.* 12 is $2 \times 2 \times 3$; rational numbers are those which can be expressed as the ratio of two integral numbers; irrational numbers those which cannot be so expressed, *e.g.* $\sqrt{2}$

The two most important irrational numbers are *e*, the base of the Napierian system of logarithms 2.7182818 . . , and π , the ratio of the circumference of a circle to its diameter, 3.14159 . . . The value of the latter has been calculated to over 700 places of decimals. There is a further class of numbers known as unreal or imaginary numbers, the roots of negative quantities. Such numbers are of great importance in many problems of physics. See Arithmetic; Fractions; Numbers, Theory of; Numeral.

Number of the Beast, THE, OR APOCALYPTIC NUMBER. A mystical or symbolical number occurring in the apocalyptic vision of the Beasts in the N.T. book of Revelation. The reference is in Rev. 13, v. 18: "He that hath understanding, let him count the number of the beast; for it is the number of a man: and his number is Six hundred and sixty and six." The Beast is here equivalent to the Antichrist who will for a time gain dominion over the whole world, but in the end will be overthrown by the angels of God (Rev. 14, vv. 14 ff.; 15, vv. 1 ff.). The number is supposed to represent the sum of the numerical values of some proper name, written in Hebrew or Greek letters, and attempts have been made to identify the Beast with various historical characters. Since 616 appears as a variant of 666 (Rev. 13, v. 18), a favourite identification is with the Roman emperor Nero (Neron Caesar—666; Nero Caesar—616: in Hebrew letters). Many other identifications have been suggested, *e.g.* Mahomet, Luther, Napoleon I, William II of Germany, Adolf Hitler. See Antichrist.

Numbers. Fourth book of the Pentateuch. It takes its title from the Septuagint, the book being so called because it contains accounts of two numberings of the children of Israel. The Hebrew title is *In the Wilderness*. Three divisions may be distinguished: (a) the first census and other events preparatory to the departure from Sinai, Num. 1-10, v. 28; (b) the journey from Sinai to Moab, Num. 10, v. 29 to 25, v. 18; (c) the second census, the appointment of Joshua as Moses' successor, and other events, Num. 26-36. Within these divisions there are a number of sections which form part of the so-called Priestly Code (Num. 1-10, 17-19, 25-31, 33-36). The poetic utterances of Balaam (Num. 23, 24) belong to the more ancient documents of the Hexateuch.

Numbers, THEORY OF. An extensive branch of mathematics,

concerned with the investigation of the nature of numbers, the characteristics of numbers, and the relations of numbers one with another. The subject has exercised the minds and occupied the time of famous mathematicians from the ancient Greeks (Pythagoras, 561-500 B.C.) to the present day. It has had a profound influence on mathematical ideas and methods, for some of the greatest mathematicians, including Gauss, have been strongly attracted to the study of numbers, and in their search for general solutions to various problems have made discoveries or evolved methods of great value. For example, the attempt to prove Fermat's Last Theorem of 1637 A.D. (it is impossible to separate a cube into two cubes, a fourth power into two fourth powers, or generally, anything above the second into two powers of the same degree; that is, $x^n + y^n = a^n$ cannot be solved in integers) has during the last 300 years underlain an immense amount of mathematical research.

Gauss's *Disquisitiones Arithmeticae* (Arithmetical Researches, 1801) is one of the masterpieces of mathematics, and inspired much of the discoveries of Jacobi, Eisenstein, Henry Smith, Kummer, Riemann, Kronecker, Hermite, Dedikind, and others. The book deals with the Theory of Congruences (the laws governing the divisibility of one number or set of numbers by others, and those governing the remainder from such division) and with the Theory of Forms (the various ways in which numbers can be expressed, particularly in equational forms, and the conditions for and the methods of securing the integral solution of equations).

Numeral. Figure or symbol used to represent number. Undoubtedly the earliest way of representing numbers was by means of notches on a stick and by perpendicular strokes. The system now in use in most civilized countries, employing the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, is partly Hindu and partly Arabic. The scale of tens is probably derived from the number of the human fingers. The value of a numeral under this system varies according to its position, *e.g.* the 7 in the numbers 7, 71, 716, 7,164 represents 7 units, 7 tens, 7 hundreds, and 7 thousands respectively, and this way of writing numbers gradually came into use in India about A.D. 500 and spread slowly through Europe. The use of the decimal point, with

corresponding results in the alteration of the value of the figure after it according to its position, is of uncertain origin.

The fundamental tens group, i.e. 10, 100, 1,000, 1,000,000, etc., are given distinctive names, e.g. ten, hundred, thousand, million, etc., and repetition of these names and those of the figures 0, 1-9 enable any particular number to be remembered, instead of a fresh name having to be remembered for every individual number. As an example, 2,408,924 is in full two million, four hundred and eight thousand, nine hundred and twenty four. The terms billion, trillion, etc., usually mean a million millions, a million million millions, etc., though in France and the U.S.A. a billion is taken to be a thousand millions only.

Though the above system has survived practically all others, the

Roman numerals are still used for certain purposes, e.g. dates. The symbols I, II, III, IIII explain themselves, but the origins of others in the system are not all certain. X for ten is probably I with a stroke across it, a symbol that must have come into very early use, and V for five is the upper half of the symbol X, as L and D for 50 and 500 are probably half the symbols once used for C and M, 100 and 1,000 respectively. The letters C and M are the initial letters of the Latin words for 100 and 1,000, *centum* and *mille* respectively. The use of IV and IX, etc., are later modifications of IIII and VIII.

The Greeks used a system of numerals in which the numbers 1 to 9 were represented by the first nine letters of the alphabet, the tens by the next nine letters, and the hundreds up to 1,000 by

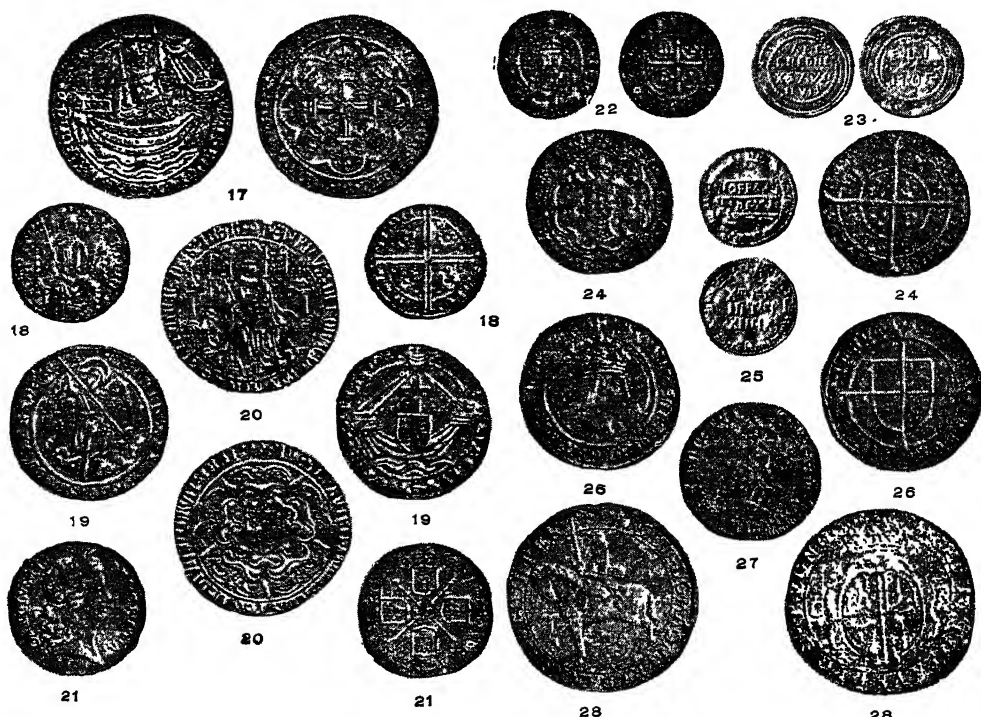
another nine letters, two obsolete letters being revived for the purpose of the system. Like other ancient systems, apart from the Hindu-Arabic, it proved too cumbersome for mathematical use, and became obsolete. See Arithmetic; Decimal; Number.

Numidia. Roman prov. of N. Africa, between the provs. of Africa and Mauritania, corresponding to E. Algeria. The name means land of nomads. Masinissa (*q.v.*) united the country with Roman aid, 201 B.C. On the overthrow of Jugurtha (*q.v.*) the Romans conquered Numidia, but left it under its own kings. Juba I having sided with Pompey, Julius Caesar made Numidia a Roman province, 46 B.C., but in 25 B.C. Augustus gave the W. part to Juba II (*see* Juba). The Numidians provided light cavalry for the Carthaginian, and later for the Roman army



Numismatics. Specimens of ancient Greek and Roman coins. 1. Cyzicus, c. 560 B.C., electrum stater. 2. Croesus, c. 555 B.C., gold. 3. Athens, 560-480 B.C., silver. 4. Athens, c. 550 B.C., silver tetradrachm. 5. Corinth, c. 600 B.C., silver. 6. Philip II, c. 359-336 B.C., gold stater. 7. Philip II, silver. 8. Chalcidice, c. 392 B.C., silver stater. 9. Alexander the Great, c. 320 B.C., silver tetradrachm. 10. Alexander the Great, gold stater. 11. Thurium, c. 450 B.C., silver. 12. Syracuse, c. 413-400 B.C., silver. 13. Roman silver denarius, c. 269 B.C. 14. Roman bronze as. 15. Julius Caesar, c. 50 B.C., gold. 16. Octavian, c. A.D. 1, silver. See p. 6150.

From specimens in the British Museum



Numismatics (continued from p. 6149). English coins. 17. Edward III, gold noble. 18. Henry III, gold penny. 19. Henry VI, gold angel. 20. Henry VII, gold sovereign, the first issued. 21. Charles II, guinea. 22. William I, silver penny. 23. Alfred, offering penny. 24. Henry VI, silver groat. 25. Offa, earliest Anglo-Saxon gold coin. 26. Henry VII, silver, shilling. 27. Elizabeth, sixpence. 28. Charles I, half-crown

From specimens in the British Museum

NUMISMATICS: THE STUDY OF COINS

Sir George Hill, formerly Keeper, Dept. of Coins, Br. Museum

Here is related the history of coins, companion articles being *Coinage*; *Mini.* See also *Gold*; *Medals*; and the articles on the various coins, e.g. *Franc*; *Mark*; *Napoleon*; *Peso*; *Shilling*, etc.

Numismatics (Gr. *nomisma*, a coin) is the science of coins and other similar objects, such as medals. Coins may be defined briefly as pieces of more or less precious metal (usually gold, silver, copper, bronze, or some other copper alloy), serving as a medium of exchange, and marked by the issuing authority with some device (type) or inscription as a guarantee of good quality and definite quantity; this is to ensure their currency as far as the authority extends. By its intrinsic value, corresponding more or less exactly to its face value, the coin is distinguished from the mere token or from paper money; it is distinguished from the medal by the fact that it serves as a medium of exchange.

The invention of coinage, by the Greeks in Asia Minor in the 7th century B.C., by the Chinese perhaps about the same time, was the first stage in the development of commerce. From the 7th century

onwards coinage also reflects, sometimes very closely, the general development of culture, throwing light on political and economic history, geography, religion, and art.

The earliest coins of the Greeks were of electrum, a natural mixture of gold and silver found in the river-sands of Asia Minor. In Greece Proper, where gold was not found, the earliest coins, such as those of Aegina, Athens, and Corinth, were of silver. Croesus, king of Lydia, 561 to 546 B.C., was the first ruler to issue coins of pure gold. Philip II of Macedon (359-336 B.C.) initiated a currency of gold and silver which, with the coinage of Alexander the Great, may be regarded as the chief international currency of the ancient world. Alexander's conquests led to the institution of coinage in lands which had hitherto used more primitive methods of exchange. The Jews had no coinage of their own before the middle of the 2nd century B.C.

In the Western world, the Greek colonies, especially in S. Italy and Sicily, had their coinages from the 6th century onwards. The Sicilian series, taken as a whole, ranks in artistic value above any other in the whole history of coinage, the 10-drachm pieces (so-called medalions) of Syracuse, first struck at the end of the 5th century, being perhaps the most famous example of the art. The Roman coinage, which from the first was under Greek influence, begins in the second half of the 4th century, with the *as* and its parts in bronze, at first, owing to its large size, cast, not struck from dies as is the rule for coins; the silver *denarius*, for long the standard denomination in the ancient world, was instituted in the 2nd. cent., weighing 4.55 grammes. The Roman coinage of gold, normally restricted to the sovereign power, did not become regular until the Imperial period. The Byzantine Empire continued the traditions of the Roman coinage, its gold coin or *besant* being an international unit of currency.

The decay of the Roman Empire, and the rise of the modern nationalities, are faithfully reflected in the style of their coinages. In the

7th century the first Mahomedan coins made their appearance; although, as the representation of living objects was forbidden, they had little influence on the artistic side, they were soon serious rivals to the Byzantine gold in international currency. It was, however, not until the 13th century that the nations of western Europe began to possess a regular gold currency, and this began with the florin of Florence, first coined in 1252, and the ducat of Venice, first coined in 1280. The English silver penny sterling, for its good quality, was largely imitated on the European Continent, especially in the Low Countries, during the 13th and 14th centuries.

The institution of the larger denomination of the *gros* by Louis IX in France, an example soon followed by other countries, robbed the smaller denomination of some of its prestige. The first English regular currency of gold, the noble, was begun in 1344.

From this time onwards the development of European coinage becomes extremely complicated. Among the northern nations, the best period of the coinage is the 14th century, although the practical absence of portraiture robs it of one source of interest. The coinage of the Renaissance in Germany was racially characteristic in its combination of vigour of portraiture with lack of refinement.

In Italy the highest level is reached in the portrait coins of the end of the 15th century, but the noblest contribution of Italy to numismatic art is in the cast medal. Antonio Pisano of Verona (first half of the 15th century), the founder of modern medallic art, and also by far its greatest exponent, is surpassed by few artists of any kind as a master of dignified portraiture and fine design. No other country produced medallists of the same quality as the best Italians, although Germany in the 16th century developed a characteristically vigorous but unimaginative school of portraiture; and in the 17th century, France in Guillaume Dupré and England in Thomas Simon could boast of portrait medallists of very high rank.

Development of Striking

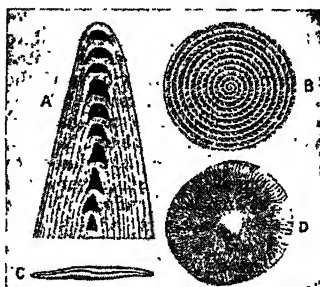
During the 16th century the technique of striking, as distinct from casting, medals was rapidly developed, by no means to the advantage of the art, which lost in significance what it gained in skill. The old method of striking the metal between dies with a sledgehammer was gradually replaced by a press worked with a screw, which was firmly established in most

countries in the second half of the 16th century, and by the second half of the 17th century superseded the primitive method. Technically speaking, perhaps the most remarkable examples of the art of striking coins were produced during this last period; Thomas Simon's *Petition Crown* (1663), with an inscription struck on its edge begging Charles II to give him employment, has scarcely any technical rival.

The 18th and 19th centuries show for the most part a deplorable falling off in the art of coinage, which is hardly redeemed by 20th century attempts at revival which have been made, chiefly in France.

Colonial Minting

The history of the colonies outside Europe is illustrated from the 16th century by a coinage often very primitive in kind; among the most interesting being the issues of the early Spanish and English colonies in America, and the



Nummulite. Diagrams illustrating formation of fossil shell. A. Highly magnified vertical section of part of shell showing construction of air chambers. B. Horizontal bisection, showing spiral of chambers. C. Vertical bisection. D. Shell viewed from above

adaptations in the West Indies of Spanish coins to local use by counter-marking, etc. In Asia, important series of coins were issued by some of the Portuguese and Dutch colonies.

India had possessed a coinage quite as early as the time of Alexander the Great, in the shape of small punch-marked pieces of silver. Greek influence, beginning with the purely Greek coins of the kings of Bactria in the 3rd century, is continued through the coinage of the Indo-Scythic rulers, and still traceable in the extraordinarily rich gold coinage of the Gupta dynasty, contemporary with the earlier centuries of the Roman Empire. The medieval coinage of India, both under native rulers and under the Mahomedan dynasties, was enormous, and fills innumerable gaps in the scanty historical records of the country.

China is thought to have begun to use coins as early as the 6th or

7th century B.C.; these were cast in bronze in the shape of knives and other primitive media of exchange; the hole at the end of the handle, by which they were strung together, was probably the origin of the hole in the later Chinese copper cash. Japan derived the style of its coinage from China. The S.E. portion of Asia has used some remarkable examples of primitive currency, the metal being cast in the shape of snail-shells or in ingots of other primitive forms.

Bibliography. British Museum Catalogue of Coins, 1873; Currency of the Farther East, J. H. S. Lockhart, 1895-98; Manual of Musalman Numismatics, O. Codrington, 1904; Historia Numorum, B. V. Kead, 2nd ed., 1911; Evolution of Coinage, G. Macdonald, 1916; History of Ancient Coinage, P. Gardner, 1918; Coins of India, C. J. Brown, 1922; Handbook of Roman Coins, H. Mattingly, 1927; Corpus of Italian Medals of the Renaissance, G. F. Hill, 1930; Handbook of English Coins, G. C. Brooke, 1932; Handbook of Greek Coins, C. T. Seltman, 1933; Coins of the Modern World, M. Comencini, 1937.

Nummulite (Lat. *nummus*, coin). Genus of fossil foraminifera. The shells are remarkable for being flattened and circular, resembling coins, and yet containing a large number of chambers arranged in a spiral. The genus was abundant during the Eocene. Limestones of that period composed chiefly of nummulites are sometimes several hundred ft. in thickness, and are particularly noticeable in the Alps, N. Africa, Asia, and Cen. America.

Nun (Lat. *nonna*, an elderly woman, mother, or nurse). Word adopted by the early Church for a woman consecrated to a life of devotion. By the beginning of the 4th century there were communities of consecrated virgins in Egypt, and a little later in Italy also. The Council of Saragossa forbade the veil to be assumed before the age of 40. The Council of Carthage prescribed 25 as the earliest age; S. Basil suggested 17.

It was understood almost from the first that the dedication of a nun was for life; but it was not regarded as absolutely irrevocable until the establishment of the Benedictine Rule. Nuns were consecrated or professed by the bishop of the diocese or his representative; and all convents of women were under his jurisdiction and general supervision. The habit, veil, etc., forming the characteristic garb of a nun, are of early date and a modification of the ordinary dress of women in ancient times.

The term nun is only correctly applied to a female member of the

Benedictine Order, or of one of the orders springing from it. Women belonging to the orders of friars—Carmelite, Franciscan, Dominican—are known as Sisters, as are the members of many modern congregations of women, whether contemplative or active. Most recent congregations follow some modification of the Augustinian Rule. See Benedictines; Mercy, Sisters of; Monasticism; Poor Clares.

Nunatak. Isolated piece of rock, possibly the peak of a buried mt., projecting through a continental ice-sheet. These have been observed near the edge of the Greenland ice-cap.

Nunc Dimittis. Opening words used as the title of a Latin canticle or hymn (Lord, now lettest Thou Thy servant depart in peace) in the Book of Common Prayer. It is the song of Simeon (Luke 2, vv. 29-32), his hymn of praise and thanksgiving on being permitted to see the infant Saviour. From early times the Christian Church has used the hymn at vespers or at compline. In the Anglican Church it is sung after the second lesson at evensong.

Nuncio (Lat. *nuntius*, a messenger). General term for a diplomatic representative of the pope, acting with powers restricted by his instructions. The members of the Polish diet were called nuncios. See Ambassador; Diplomacy; Legate.

Nuncomar OR NANDA KUMAR (ex. 1775). Indian official. Governor of Hooghli in 1756, he was deputy to the nawab of Murshidabad when Warren Hastings was appointed resident there in 1758. Discovered in treasonable correspondence against the East India Company, he was sent to Calcutta in 1770, and there implicated in charges of corruption brought against the diwans of Bengal and Bihar. In 1775 he accused Hastings, then governor, of peculation. Before the matter had been gone into by the council, Nuncomar was arrested on a charge of forgery, tried before Sir E. Impey, found guilty, and executed. Impey and Hastings were impeached, but exonerated. See Hastings, Warren; India.

Nuneaton. Mun. bor. and market town of Warwickshire, England. It is on the little river Anker, 97 m. N.W. of London and 9 m. N. of Coventry, and is served by rly. and canal. The chief buildings are the churches of S. Nicolas, S. Mary, and Chilvers Coton; the council house and law courts; Arbury Hall; and

a grammar school dating from the 16th century and a college for the poor, 1712. Industries are coal-mining; the making of bricks, pipes, and tiles; textiles, including hosiery, wool spinning, felt hats, silks, and rayon; fellmongery and leather goods; light engineering, and rly. work. A house for Benedictine nuns was founded here in 1150 and around it Nuneaton grew up. There are a few remains of the nunnery. The town was made a borough in 1907. George Eliot (q.v.) was born at Arbury Farm and around are other places associated with her life and work. Market day, Sat. Pop. est. 52,000.

Nuñez Cabeza de Vaca, ALVARO (c. 1490–c. 1564). Spanish explorer. In 1527 he sailed from Spain with an expedition which met with disaster in the Gulf of Mexico, but Nuñez reached land, and after a most adventurous journey reached the city of Mexico in 1536, and returned to Spain. In 1540 he was appointed governor of the provinces of the La Plata river, and reached Asunción in 1542. The colonists revolted and sent him home in 1545, and later he was sentenced to banishment. On being pardoned he was made a judge. Nuñez wrote an account of his first expedition (Eng. trans. 1851).

Nuñez de Arce, GASPARE (1834–1903). Spanish poet and politician. Born Aug. 4, 1834, at Valladolid, he was intended for a priest, but, refusing to adopt that vocation, he went to Madrid and became a journalist. He was only a youth when his first play was produced. Later he served as a war correspondent in Africa. Soon he was conducting a paper of his own, and in 1865 he entered political life, his liberal views having attracted attention. In 1868 he was made governor of Barcelona, and during 1882–90 was a cabinet minister, being in turn in charge of the colonies, home affairs, the finances, and education. He died at Madrid, Feb. 12, 1903. His lyrics are considered his best work.

Nunhead. District of S.E. London. It is E. of Peckham Rye, and forms part of the bor. of Camberwell. It has a rly. station, a cemetery of 50 acres, consecrated in 1840, and the underground Beachcroft reservoir of the Metropolitan Water Board, which cost £230,000.

Nunkiang. One of the nine north-eastern provinces of China. Area 23,912 sq. m. Population

2,094,000. It contains 16 counties with Mergen as its capital. The Changchun rly. runs through the province, linking it with branch lines to other parts of the north-east. Principal products are soya bean, kaoliang, wheat, and gold.

Nun Moth. Popular name for a black and white moth (*Liparis monacha*) known in Britain as the Black Arches. In central Europe it is a great pest, since its caterpillars destroy the leaves of spruce and other trees. In Bohemia an attack lasting for four years defoliated over 90,000 acres of forest. Experimental control by poison dust liberated from aeroplanes gave encouraging results.

Nunn, SIR PERCY (1870–1944). British educationist. Educated at Bristol university, he was a secondary school teacher, and in 1905 was appointed vice-principal of the London Day Training College, succeeding as principal in 1922. Ten years later, when the college was transferred to the control of London university, he continued in office as director until 1936. He also represented London university on the teachers' registration council, and was visiting professor at Columbia university in 1925. He wrote extensively on educational methods, e.g. Education Reform, 1917; Education: its Data and First Principles, 1920. He was knighted in 1930. Nunn died Nov. 12, 1944.

Nupe. District of Africa, now part of Nigeria. It forms a prov. N. of the Niger and the capital is Bida. About the middle of the 19th century the country came under the rule of the Fulas. The British took possession of it in 1897, but only temporarily, its real absorption taking place in 1901, when a new emir, favourable to British interests, replaced a deposed one. See Fula; Nigeria.

Nuraghe. Prehistoric round tower in Sardinia. The typical form is of rough-coursed blocks, clay-mortared, having a basal diameter of about 30 ft., sloping slightly inwards. From the doorway, usually facing S., a corridor leads to an inner chamber, about 15 ft. across, with a vaulted roof. On the right of the entrance is a guard-niche, on the left an ascent to an upper chamber, similarly guarded. Traces of 6,000 have been found. The largest, protected by platforms with flanking towers, are sometimes surrounded by villages of smaller nuraghi. See illus. p. 6,153; See also Broch.

Nur-ed-din (c. 1118–1174). Mahomedan warrior. He was born at Damascus, and about 1145 he

succeeded his father as ruler of a state in Syria, making Aleppo his capital. During the Second Crusade he took Damascus and drove the Christians from Syria. In 1159, however, he was beaten by Baldwin, king of Jerusalem, but later sent into Egypt an army which conquered that country from the caliph. An uncle of Saladin, Nur-ed-din died May 15, 1174. Another Nur-ed-din was an astronomer. Born in Morocco, he lived in the 12th century, and wrote an astronomical work of some note.

Nuremberg (Ger. Nürnberg). Second largest city of Bavaria, Germany. It is the capital of the



Nuremberg arms

prov. of Franconia, and is situated on the Pegnitz, 95 m. N. of Munich. Nuremberg was for long an important rly. junction and occupied a key position on the Rhine-Main-Danube canal system. Until the Second Great War the city possessed unrivalled relics of its historic past, whole streets being virtually unaltered from medieval times. They centred upon the burgrave's castle and the imperial castle, dating respectively from the 11th and 13th centuries. The 15th-cent. house of Dürer and the 16th-cent. house of Hans Sachs were noteworthy private houses, and there were numerous churches of great historic value, e.g. S. Sebaldus (13th cent.), S. Lawrence (13th-15th cent.), the Holy Ghost (1331), S. Aegidius, with a Van Dyck altar (1140, rebuilt 1711-18), S. James (14th cent.), S. Peter (15th cent.), S. Rochus (16th cent.) Of other public buildings the town hall was remarkable, being erected 1332-40, with additions dating from 1520 and a beautiful renaissance wing of 1616-22. The grammar school was founded by Melanchthon in 1526.

Nuremberg has a long and chequered history, having become a free city in 1219 and being endowed with unusual privileges—rights of coinage, customs rights, urban laws and judges, and the ownership of the castle and its surroundings. It traded with all European countries, especially in silks, oriental goods, and various

products of its artists and craftsmen. The first watches, known as "Nuremberg eggs," are said to have been made here. During the 15th and 16th centuries many of the greatest German painters, sculptors, poets, and scientists lived in the town. During the Thirty Years' War it fell into decay, and was embodied with Bavaria in 1806 when she joined the Rhenish federation. In the later 19th century the industrial importance of Nuremberg again increased, when its toys, pencils, and beer became widely known. The establishment of a large factory by Siemens Electric, and other large engineering works, brought additional prosperity to the town, the pop. of which (1939) was 430,851. During the Second Great War the town, which had been the scene of the annual Nazi party congress, was repeatedly bombed by Allied aircraft, much of the old town being virtually destroyed. It was entered by units of the U.S. 7th army on April 16, 1945. S.S. troops defended it bitterly, but all organized resistance ceased on April 20. The town was, after the end of the war, included in the U.S. zone of occupation. The trial of the major war criminals (see Nuremberg Trials) was held here.

Nuremberg Laws.

Series of anti-Semitic edicts promulgated at the German Nazi party conference at Nuremberg, Sept., 1935. One edict, the Reich citizens' law, deprived Jews of their rights as German citizens, and reduced them to a status called "members of the state"; this deprived the Jew of the vote, forbade him to serve in the armed forces, and excluded him from

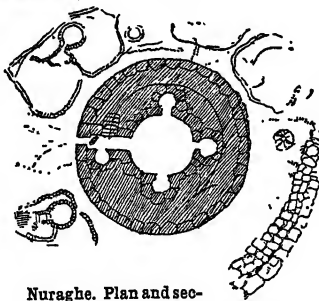
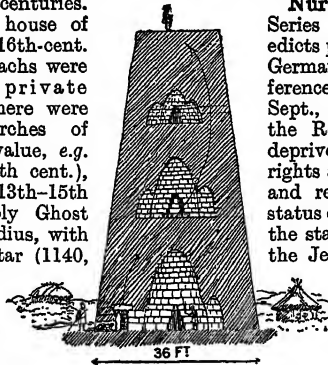
participating in the cultural life of the country. Another edict, the protection of German blood and German honour, prohibited marriage or extra-marital relations between Jews and so-called Aryans. Any Jew contravening the measure, even before the passage of the law, was liable to a long term of imprisonment. "Aryans" were required to leave any house where there were resident Jews, and no Jewish household with adult males might employ female domestic servants under the age of 45.

Within certain limits, the original Nuremberg Laws permitted Jews their own religion, culture, and social economy. Later the laws became more severe, notably after the assassination of the German diplomat vom Rath by a Polish Jew in Paris, Nov. 7, 1938. Jews were then excluded from places of entertainment, deprived of the right of inheritance, made liable to heavy poll taxes, forbidden to practise any of the professions or engage in journalism; their passports were withdrawn, and they were held collectively responsible and were collectively fined for any individual Jew's offence or alleged offence. Jewish premises were required to be marked with a distinctive sign, while Jews themselves had to wear a distinguishing mark (the Star of David) on their clothing.

Jews were thus reduced to the status of complete social outcasts in obedience to the Nazi doctrine that a permanent barrier must be erected between German and Jew. The Nuremberg Laws formed the pattern of the anti-Jewish legislation introduced into fascist Italy and other German satellites, as well as, during the Second Great War, into German-occupied territory. See Anti-Semitism; Germany in the Second Great War; Jews.

Nuremberg Trials. Trials of the civil and military leaders of Nazi Germany, together with certain Nazi organizations, by international military tribunal at Nuremberg, Nov. 20, 1945-Oct. 1, 1946.

In Oct., 1943, a United Nations war crimes commission was set up in London to collect evidence for the preparation of an indictment against Axis and satellite war leaders. A declaration by the foreign ministers of Great Britain, the U.S.A., and the U.S.S.R. proclaimed that at the time of any armistice to any govt. which might be set up in defeated Germany, such Germans as had been responsible for, or



Nuraghe. Plan and section of a Sardinian prehistoric round tower. The spiral line seen in the section shows the position of the staircase. See text in facing page

consenting parties to, atrocities, massacres, or executions alleged against them should be sent back to the countries in which their crimes had been committed and there tried by local laws. The major criminals, whose offences had no particular geographical location, were to be arraigned and tried by joint decision of the Allied govts.

After the surrender of Germany legal experts of the U.K., U.S.A., U.S.S.R., and France met in London on June 26, 1945. Their conference resulted in the four-power agreement of Aug. 8, setting up an international military tribunal for the trial of war criminals whose crimes had no precise geographical location. The law under which defendants were to be tried was to be international law, not the law of the victorious countries.

Members of the Tribunal

The tribunal, as established by the charter, comprised the following members and alternate members: U.K., Sir Geoffrey Lawrence (president), Sir Norman Birkett (alternate); U.S.A., Francis Biddle, Justice John J. Parker (alternate); France, Prof. D. de Vabres, R. Falco (alternate); U.S.S.R., Maj.-Gen. I. Nikitchenko, Lt.-Col. A. Volchikov (alternate). Chief prosecuting counsel were Sir Hartley Shawcross, British attorney general; R. H. Jackson, U.S.A.; F. de Menthon, France; and Gen. Rudenko, U.S.S.R.

This tribunal was given the following powers: (1) to summon witnesses to the trial and require their attendance and testimony; (2) to interrogate any defendant; (3) to require the production of documents and other material evidence.

The tribunal was not to be bound by the technical rules of evidence, and was relieved of any obligation to require proof of facts of common knowledge, though it was required to take judicial notice of government and U.N. documents and reports. It was authorised to impose a capital sentence or any other punishment it deemed just; and to deprive the convicted person of any stolen property and order its surrender to the Allied control council for Germany. The judgement of the tribunal was final and not subject to appeal, and in case of guilt the sentences were to be carried out in accordance with the orders of the control council, which was authorised to reduce or otherwise alter the

sentences at any time it considered fit, but not to increase their severity. Neither the tribunal nor its members or their alternates could be challenged by prosecution, defendants, or counsel. Decisions of the tribunal were by majority vote, the president having a casting vote.

The function of counsel for the defendant was allowed to be discharged at the defendant's request by any person professionally qualified to plead in courts of the defendant's country, or by any person authorised by the tribunal. All court proceedings had to be conducted in, and all official documents submitted on either side had to be translated into, English, French, Russian, and the language of the defendant. The indictment was required to include full particulars specifying in detail the charges against the defendants. Every defendant had the right to produce evidence in support of his defence and to cross-examine witnesses called for the prosecution.

The permanent seat of the tribunal was at Berlin, but the trial itself was held at Nuremberg in the U.S. sector. The U.S. army was made responsible for guarding the prisoners, the press arrangements, and the elaborate system of headphones and interpreters for simultaneous translation of the proceedings into the four languages. During the course of the trial the defendants were kept in rigid solitary confinement. They were deprived of all insignia of rank and fed on army rations. They were forbidden to possess any article likely to facilitate self-injury; and as a precaution against suicide each prisoner was watched by guards day and night.

Indictment on Four Counts

On Aug. 29 a committee of the four chief prosecuting counsel issued from London a first list of criminals to be tried. There were four counts of the indictment, charging the defendants with (1) conspiring, or having a common plan, to commit crimes against peace; (2) committing specific crimes against peace by planning, preparing, initiating, and waging wars of aggression against a number of states; (3) war crimes, i.e. murder and ill-treatment in occupied territory or on the high seas, deportation for slave labour, murder and ill-treatment of prisoners of war, killing of hostages, plunder and devastation of property; (4) crimes against humanity, i.e.

murder, extermination, enslavement, and deportation committed against civilian populations before and during the war, and political, racial, and religious persecution.

The 24 accused were:

Hermann Goering
Joachim von Ribbentrop
Rudolf Hess
Ernst Kaltenbrunner
Alfred Rosenberg
Hans Frank
Martin Bormann
Wilhelm Frick
Robert Ley
Fritz Sauckel
Albert Speer
Walter Funk
Hjalmar Schacht
Franz von Papen
Gustav Krupp
Konstantin von Neurath
Baldur von Schirach
Arthur Seyss-Inquart
Julius Streicher
Wilhelm Keitel
Alfred Jodl
Erich Raeder
Karl Doenitz
Hans Fritzsche

With the exception of Bormann, who had disappeared in the capture of Berlin, all these defendants had been arrested after the German collapse.

Moreover, the following organizations were declared illegal, and any defendant who had been a member of any of them could be tried and punished on that ground alone: the Reich cabinet, the leadership corps of the Nazi party, the S.S., the Gestapo, the S.A., and the general staff and high command of armed forces.

Ley committed suicide Oct. 25, Kaltenbrunner was ill, and the tribunal decided to defer the trial of Krupp on account of his physical and mental condition; so that only 20 defendants appeared when the trial opened at Nuremberg, Nov. 20. During the 10 months it lasted, 403 open sessions were held; 33 witnesses testified orally for the prosecution; and 61, in addition to 19 of the defendants, for the defence; a further 143 witnesses gave evidence for the defence by written answers, 88,000 affidavits signed by 155,000 persons were submitted for the living defendants and 158,000 were sent in on behalf of the organizations. Much of the evidence tendered by the prosecution was derived from captured German documents, and films of concentration camps were shown.

On Aug. 31, 1946, the tribunal retired to consider its verdict. On Oct. 1 the judgements were read. The general judgement found that a common Nazi plan to prepare and wage war had existed. Certain

defendants had planned and waged aggressive war against 12 nations. War crimes had been committed by Germany on the high seas and in every country occupied by her. The Germans were guilty of crimes against humanity. The leadership corps of the Nazi party and the S.S. were declared

and were discharged. The Russian members of the tribunal added a rider dissociating the U.S.S.R. from the acquittals, and declaring that Hess should have been sentenced to death.

All those whose lives were forfeit, except Kaltenbrunner, appealed to the control council

1946; 22 Cells in Nuremberg. D. M. Kelley (psychiatrist to the prison), 1947; War Crimes Trials, ed. Sir D. M. Fyfe, 1948, etc.

After the main Nuremberg trials, 177 lesser Nazis—diplomats, civil servants, and others—were charged with war crimes at Nuremberg in 12 separate cases brought before U.S. military courts. Of 142 convicted, 24 were sentenced to death by hanging, the others to imprisonment. Two American and 373 German defence counsel were engaged. The last case ended April 15, 1949.

Nurmi, PAavo (b. 1897). Finnish runner, born at Åbo (Turku), June 13, 1897. He established world records for the mile in 1923, two miles in 1931, five miles in 1924, six miles in 1930, and ten miles and one hour in 1928. One of the greatest and most consistent long-distance runners of all time, he won six Olympic titles; in 1924 he was champion over 1,500 metres, 5,000 metres, and in the cross-country race. Known as the Flying Finn, Nurmi paid several visits to Great Britain, and besides setting up various records won two A.A.A. championships in 1922.

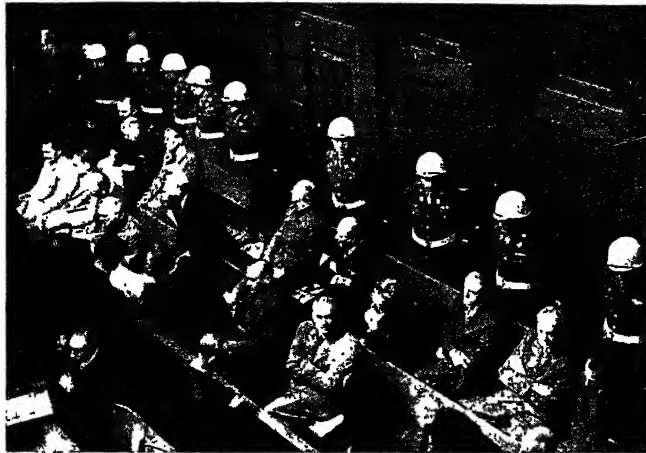
Nürnberg. German name for the city more familiar to English speakers as Nuremberg (*q.v.*).

Nursery. See Crèche; Day Nursery; Nursery School; also Garden and Gardening; Grafting.

Nursery Rhymes. Verses repeated to young children, and often handed down by tradition. The first actual collection is supposed to have been made in Boston, U.S.A., in 1719; the first known British collection, Mother Goose's Melody, was issued about 1780 by John Newbery, and comprised but 30 pieces. It may possibly have been compiled and in part written by Goldsmith. To each rhyme a whimsical moral is appended.

Nursery rhymes are of the most varied origin. Some are believed to contain traces of heathen worship and magical incantations. In others allusions to historical events or political controversies have been suspected. But, in spite of much discussion, few definite results have been attained. Some counting-out rhymes contain Welsh numerals in a corrupt form. Other rhymes, accompanied by action, are probably derived from medieval dances.

References to some rhymes—such as Sing a Song of Sixpence—are to be found in Elizabethan drama. The Wise Men of Gotham (*q.v.*) probably dates from the 16th century. Some rhymes are but



Nuremberg Trials. The chief Nazi defendants face their judges, November 20, 1945. Front row, L. to R., are Goering, Hess, Ribbentrop, Keitel, Rosenberg, Frank, Frick, Streicher, Funk, Schacht. Back row, L. to R., are Doenitz, Raeder, Schirach, Sauckel, Jodl, Papen, Seyss-Inquart, Speer, Neurath, Fritzsche

criminal organizations; the Reich cabinet as such was not, nor were the S.A., the general staff, or high command. The Nazi leadership was guilty on all four counts. Responsibility could not fall on Hitler alone, but must be shared by generals, statesmen, and business men who cooperated with him in his regime.

In the cases of individual defendants, verdicts and sentences (the latter passed in the afternoon of Oct. 1) were as follows: Goering, Ribbentrop, Keitel, Rosenberg, Jodl, guilty on all counts; Kaltenbrunner, Frank, Sauckel, Bormann, guilty on counts 3 and 4; Frick, Seyss-Inquart, guilty on counts 2, 3 and 4; Streicher, guilty on count 4. These twelve were sentenced to death by hanging. The following received life imprisonment: Hess, guilty on counts 1 and 2; Funk (counts 2, 3 and 4); Raeder (counts 1, 2 and 3). Schirach, guilty on count 4, and Speer, on counts 3 and 4, were sentenced to 20 years' imprisonment. Neurath, guilty on all counts but with mitigating circumstances, received 15 years' imprisonment; Doenitz, guilty on counts 2 and 3, received 10 years. Schacht, Papen, and Fritzsche were found not guilty,

for clemency. Goering, Jodl, and Keitel asked to be shot instead of hanged in the event of their pleas being rejected. Hess, Funk, Neurath, and Doenitz appealed for mitigation of their prison sentences. On Oct. 10 the council rejected all appeals and announced that death sentences would be carried out by hanging at Nuremberg prison. On Oct. 15 it was stated that Hess, Funk, Raeder, Speer, Schirach, Neurath, and Doenitz would serve their sentences in Spandau prison, in the British sector of Berlin. Executions were fixed for 1 a.m. of Oct. 16, but at 10.45 p.m. on Oct. 15, Goering was found poisoned in his cell. Execution of the rest, completed by 2.45 a.m., was carried out on two gallows in the gymnasium of the prison by an American sergeant and lance-corporal in the presence of the quadripartite allied commission, doctors, army officers, representatives of the German authorities, eight press representatives, and an official photographer. The bodies were cremated and the ashes disposed of secretly. See War Criminals; also biographies of the individuals in this Encyclopedia. Consult The Nuremberg Documents, P. de Mendelssohn,

surviving scraps from much longer pieces. Others that have definitely taken their places in the corpus of British nursery rhymes are demonstrably modern, and of some the authors are known. A Frog He Would a Wooing Go was written by John Liston, who based it on an earlier series of verses; Wee Willie Winkie was written by the Scottish poet William Miller.

Bibliography. Popular Rhymes of Scotland, R. Chambers, 1826; Nursery Rhymes of England, J. O. Halliwell-Phillips, 1842; Games and Songs of American Children, W. W. Newell, 2nd ed. 1903; Nursery Rhyme Anthology, L. Derwent, 1838.

Nursery School. School for children from two to five years of age, i.e. below the age of compulsory school attendance. The purpose of such schools is to provide a healthy, happy environment in which the child can develop physically, mentally, and socially. They bridge the gap between the child welfare clinic and the infant school. The pioneer of nursery schools in the U.K. was Rachel

Macmillan, who planned and operated at Deptford a large open-air school in which children enjoyed benefits at a cost of less than £12 per annum a child. In 1914 she opened a training centre for teachers in open-air nursery schools; in 1930 the Rachel Macmillan training college for teachers was established. Nursery schools are still relatively few. Under the Education Act, 1944, if parents require education for children between 2 and 5, local authorities must provide it, either in special nursery schools or in nursery classes in other schools. In 1946, however, only 6,500 children in England and Wales were attending nursery schools; but 54,000 were attending nursery classes in infant schools, more than 100,000 were in ordinary classes in primary schools, i.e., 9·4 p.c. of all children in the age group were attending school. There is a Nursery School Association of Great Britain, 1 Park Crescent, London, W.1. Consult The English Nursery School, Mrs. P. E. Cusden, 1942.

at S. Thomas's Hospital, London, which became the prototype of nurses' training schools in almost every country.

Although a movement towards organization and registration of trained nurses began in England in 1887, and a bill was introduced in 1904, the Nurses Registration Act did not become law until 1919. This Act set up a general nursing council for England and Wales to keep the state register, conduct examinations, and approve training schools. Similar councils were set up in Scotland and Northern Ireland. The register is divided into parts: general trained nurses (S.R.N. = state registered nurse); sick children's nurses (R.S.C.N. = registered sick children's nurse); fever nurses (R.F.N. = registered fever nurse); mental nurses (R.M.N. = registered mental nurse); mental defective nurse (R.N.M.D. = registered nurse, mental defective). State registration is usual in most countries.

As the field of nursing expanded, specialised training was added to hospital instruction. District nursing (founded in 1859 by William Rathbone of Liverpool, with the help of Florence Nightingale) needed special training, and the district nurse with midwifery and public health training as well as three to four years' hospital training is often a very highly qualified woman. Other categories are: the public health nurse, or health visitor as she is known in Great Britain, whose function is almost entirely educational and preventive, as is that of the school nurse; the industrial nurse, who in factories, big stores, hotels, etc., is responsible for the health and welfare of the staff; the private nurse, who attends a patient in his or her own house.

Many nurses take up midwifery, or maternity nursing, in hospital or domiciliary practice, but midwifery, although allied to nursing, is a separate profession, defined by Act of parliament. Nursing overseas in the mission field and elsewhere often necessitates special training in tropical medicine.

With the Services

In the U.K. there are permanent nursing services connected with the fighting forces. The Army Nursing Service, the direct descendant of Miss Nightingale's band of ladies in the Crimea, was named, 1902, Queen Alexandra's Imperial Military Nursing Service, renamed, 1949, Queen Alexandra's Royal Army Nursing Corps. Queen Alexandra's Royal Naval Nursing

NURSING: CARE OF THE SICK

J. Elise Gordon, Editor, *Nursing Mirror and Midwives' Journal*

The history and scope of nursing is here described, as well as some of the problems associated with it. See also Hospital; Midwife; Nightingale, Florence; Nursing, Male

Nursing as an art, and as a profession, has been carried on since the earliest days of history. The early Hindus, the Egyptians, and above all the Jews, laid down excellent rules for hygiene and health, and Hippocrates (q.v.) sought 400 years B.C. to inculcate the principles of good nursing.

With the coming of Christianity the care of the sick and suffering assumed new importance, and orders of women were formed specially devoted to nursing. The first woman to be named specifically in connexion with nursing care in the early church was the deaconess Phoebe, but during the centuries of the church's growth others are mentioned by name out of a considerable body of women devoting themselves to succouring the sick. The religious orders of nuns, which flourished from the 5th century onwards, took up the work, and at the time of the Crusades there arose the famous military nursing orders, notably the Knights Hospitallers of S. John of Jerusalem, of Rhodes, and of Malta (an order still in existence and world-wide), the Teutonic Knights, who combined military and nursing duties, and the Knights of S. Lazarus, who devoted

themselves to the service of lepers. Famous medieval saints associated with the care of the sick are S. Francis of Assisi, S. Clare, S. Elizabeth of Hungary, and S. Catherine of Siena. The 12th and 13th centuries also saw the rise of secular nursing orders, such as the Béguines of Flanders, the Franciscans, the Poor Clares. With the decay of the religious orders in Protestant countries, nursing was relegated to ignorant and sometimes unscrupulous persons, such as those depicted by Charles Dickens in *Sairey Gamp* and *Betsey Prig*. But in 1836 Theodor Fliedner and his wife set up at Kaiserswerth, Germany, a hospital where women were trained in nursing. From this model, deaconesses' hospitals sprang up in many parts of the world; and from it—even more important—Florence Nightingale received inspiration for her great work. Her influence upon contemporary nursing has never been properly assessed, and 20th century practice has not even yet caught up with all her ideas. Following her practical demonstration of military nursing in the Crimea, which shook the world, she founded the famous training school for nurses

Service, a much smaller body, was formed in 1902; Princess Mary's R.A.F. Nursing Service in 1918. Queen Elizabeth's colonial nursing service, the prison nursing service, the ministry of Pensions nursing service, the industrial nurses employed in royal ordnance factories, and the Civil Nursing Reserve formed during the Second Great War complete the govt. dept. nursing services.

The Nurses Act, 1943, limited the use of the term nurse (though not the right to practise as a nurse) to certain specified categories, and authorised the setting up of the assistant nurses roll, and training for the assistant nurse. By 1946 there were more than 37,000 state enrolled assistant nurses (S.E.A.N.).

Ministry of Health Inquiries

The British ministry of Health set up a division of nursing and midwifery in 1941, with a chief nursing officer and assistants; the ministry of Labour and National Service has a nursing services branch, with a principal nursing officer, concerned with recruitment. A committee for England and Wales, under the chairmanship of Lord Rushcliffe, appointed by the ministry of Health in 1941, reported in 1943 advocating improvements in salaries and conditions of work, which were accepted by the govt.; similar improvements for Scotland and Northern Ireland were put into effect; these and subsequent improvements did not provide enough nurses to meet the ever increasing number needed, although the British nursing force increased by more than 15,000 between 1938 and 1945. A working party set up Jan., 1946, to consider recruitment and training reported in Sept., 1947, emphasising the importance of loss of students in training through dislike of hospital discipline, hours and pressure of work, and other causes, and recommending reorganization to ease the strain on both teachers and taught. The Nurses Act, 1949, authorised the minister of health to set up a standing training committee in each of the 14 hospital areas of England and Wales, and gave the general nursing council power to finance training, and to admit to the register some nurses (*e.g.* those trained abroad) formerly excluded.

The International Council of Nurses, inaugurated 1899 by a British nurse, Mrs. Bedford Fenwick (the first of all international women's organizations), is a federation of national nurses' associa-

tions (32 belonged to it in 1939) with four major interests: (1) the professional, social, and economic welfare of nurses; (2) nursing education; (3) nursing service; (4) legislation as it affects nurses and nursing. Committees collect and collate information. Conferences are held in different countries, usually at four-yearly intervals; that held at Atlantic City, U.S.A., in 1947 was, however, the first for ten years. A golden jubilee congress was fixed for Stockholm in 1949. The H.Q. is at 19, Queen's Gate, London, S.W.7. The National Council of Nurses of Great Britain and Northern Ireland (at 17 Portland Place, London, W.1) is a federation of professional nursing organizations in the U.K.

Another organization with international interests, with H.Q. at 45, Gloucester Place, London, W.1, is the Florence Nightingale International Foundation, set up in 1934 as a memorial to Miss Nightingale, the function of which is to provide postgraduate nursing courses for nurses of various countries.

Postgraduate training for nurses in the U.K. is carried out by various bodies, including a few university faculties which offer a diploma in nursing. There is scope, however, for much more, and the British Empire nurses war memorial fund, founded 1946 (through the Nursing Mirror, a professional weekly journal for nurses) as a memorial to the 3,000 nurses and auxiliaries of the British Commonwealth who gave their lives in the Second Great War, had as its object the provision of postgraduate travelling scholarships for nurses, as well as the creation of a memorial chapel in Westminster Abbey. To this fund, the nurses of the British Commonwealth themselves subscribed the first £50,000.

The International Red Cross is in many countries responsible for professional nursing training, for which purpose it runs training hospitals; in the U.K. it is concerned with the training in home nursing and first aid of auxiliaries and voluntary workers.

Nursing, MALE. In mental hospitals men nurses care for male patients. Their training, similar to that of women nurses, is carried out in mental hospitals recognized as training schools by the Royal Medical Psychological Association. They sit for the same examinations as women; and their conditions of service are also governed by the

Rushcliffe committee's recommendations. *See* Nursing.

Nursing, ROYAL COLLEGE OF. Professional organization founded 1916. It has a membership of over 46,000 registered nurses, and a junior branch, the Student Nurses' Association, composed of over 13,000 persons in training. It aims at furthering the progress of nursing as a profession; at presenting to the government and representative bodies the views of state registered nurses on problems of their work, and negotiating on their behalf; and at promoting post-certificate nursing education. Six area organizers act as links between headquarters (1a, Henrietta Place, London W.1) and 126 branches. A Scottish board and a committee for N. Ireland also operate. The official journal, *Nursing Times*, is published weekly. Affiliated to the Royal College of Nursing are the Association of Sick Children's Hospital Nurses and also the Society of Registered Male Nurses.

Nursing Home. Home where invalids and others are received for operations, childbirth, rest cures, etc. It must be registered by a local authority. The certificate of registration must be displayed, and the medical officer of health may inspect the home at any time.

Nut. Strictly speaking, the dry fruit developed from the carpels of the flower. The carpel contains two or more ovules, but as a rule only one develops into a seed—the kernel of the nut. This is invested by a shell of hard or leathery tissue, which does not split until the seed germinates. The term as used commercially or popularly does not always coincide with the botanical meaning; thus, an acorn is a true nut; a ground-nut is not a nut, but a pod; walnut is the "stone" of a fruit formed like a plum or cherry (drupe); and earth-nut, or pig-nut, is a tuber. Types of true nuts are found in hazel, beech mast, and sweet chestnut. *See* Brazil Nut; Cob-nut; Fruit.

Nut. Small piece or block of metal or other material pierced with a hole which is threaded to conform to a standard screw-thread system. It is used in securing a bolt or attaching one member in machinery to another. Nuts for bolts are usually of mild steel, but sometimes of brass, aluminium, or alloy. For common bolts they are square on plan; for engineers' bolts the hexagon is usual. Spanners turn them, and a washer is interposed between the inner surface of the nut and the face of the



Nutcracker. Occasional British visitor, of the crow family

member through which the tail of the bolt protrudes. Nuts to be turned by the fingers are of two kinds; wing-nuts, which have projecting lugs facilitating grip by thumb and fingers; and milled-edge nuts, cylindrical in plan and with a roughened periphery. Lock-nuts incorporating a locking device, and double nuts turning in opposite ways, prevent loosening and back-turning under vibration.

Nutation. In astronomy, the oscillatory movement produced in the earth's axis by the attraction of the moon on the equatorial protuberance of the earth. The line of the earth's axis cuts the heavens at a point known as the celestial pole, which describes a circle round the pole of the ecliptic, and this circle is in itself subject to a small disturbance, making the circle a wavy one instead of uniform. This nodding motion is called nutation (Lat. *nuere*, to nod). See Precession.

Nutcracker (*Nucifraga caryocatactes*). Bird belonging to the crow family. Widely distributed over Europe and Asia, it is an occasional visitor to Great Britain. The bird is rather smaller than a jackdaw, and has brown plumage spotted with white, except the wings and tail, which are black. It occurs in woods, where it feeds mainly on seeds of conifers and insects. The word is also used as the name for a metal implement used for cracking nuts.

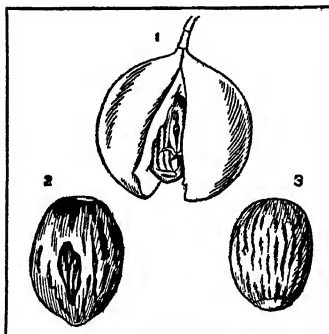
Nuthatch (*Sitta*). Genus of birds of the family Sittidae. The common nuthatch, *S. europaea*, is a small bird, fairly common in the S. and Midland counties of England, rare in Scotland, and not found in Ireland. It is about 5 ins.



Nuthatch searching a tree trunk for insects

long; the plumage is bluish grey on the upper parts, with white throat, buff under parts, and grey and black tail. It has the habit of running upwards or downwards over the branches and trunk of a tree like a mouse. It nests in a hole in a tree; and if the hole is large, stops it up with clay, leaving an opening only large enough to pass through. It feeds upon insects and grubs that it finds in crevices in the bark, in search of which it taps the tree like a woodpecker. In autumn it takes partly to a diet of nuts, which it fixes in a crevice in the bark and splits with its beak.

Nutmeg (*Myristica fragrans*). Seed of a tree of the family Myristicaceae, native of Malaya. The



Nutmeg. 1. Fruit beginning to open. 2. Nutmeg covered with mace. 3. After removal of mace

tree attains a height of about 30 ft., has large, aromatic, leathery, alternate, evergreen leaves, and small, pale yellow flowers. The small fruits are pear-shaped, containing a single seed (nutmeg), which is invested first with a crimson fibrous network (mace), and externally by a thick, fleshy coat. The tree begins to bear fruit when eight years old, attains its maximum at twenty-five, and continues profitable for another 35 years or so. Nutmeg and mace are used in cookery as a flavouring for custards and puddings; and in medicine as an aromatic, stimulant, and carminative, but chiefly to disguise the taste of less pleasant drugs, such as rhubarb.

Nutrition. This subject is discussed under Food and Nutrition.

Nux Vomica. Seeds of a small tree, *Strychnos nux-vomica*, member of the family Loganiaceae. A native of India and N. Australia, it has strongly veined, oval, opposite leaves, and panicles of greenish-white tubular flowers. The fruit is a large berry, resembling an orange, with numerous silky-haired, disk-like seeds an

inch across, embedded in the edible pulp. The dried seeds, ground to powder, yield the alkaloids strychnine, brucine, and loganin. The proportion of alkaloids varies from 2 to 3 p.c., of which half is strychnine.

The latter drug is also obtained from the triangular, hairless seeds of the allied plant Ignatius Bean (*S. ignatii*), of the Philippines, which are frequently substituted. See Strychnine.



Nux Vomica. Foliage, flowers, and fruit (A)

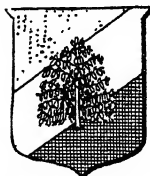
Nyamwezi. Negroid people of Bantu speech in Tanganyika Territory, E. Africa. The plural is Wanyamwezi. Mostly in the highlands between the Victoria Nyanza and Tabora, they are a muscular, dark-brown people, 5½ ft. tall, long-nosed, and often curly-haired. The men tend cattle, sheep, and donkeys; the women raise crops of grain, sweet potatoes, and cassava. Beehives are often kept in the oblong dwellings.

Nyanza. Central African word for lake. Examples are the three lakes which form the main sources of the Nile, i.e. Victoria Nyanza, Albert Nyanza, Edward Nyanza.

Nyasa. Third largest lake in Africa. It is a deep basin about 360 m. long and from 10 to 55 m. wide, lying at an alt. of 1,555 ft., and occupies part of the Great African Rift Valley. Its greatest depth is 386 fathoms. To the N. and E. it is closely approached by lofty mts. and tablelands. The only outlet is the Shire river, issuing at its S. extremity and flowing into the Zambezi. The principal affluents are the Songwe, Rukuru, Bua, and Lintipi on the W. coast. The water of the lake is fresh and its level varies with the amount of the annual rainfall. Fort Johnston, at the S. outlet, Kota-Kota, and Karonga are the most important ports. Lake Nyasa was discovered in 1859 by Livingstone from the S. and Roscher from the E.

Nyasaland. British protectorate in Central Africa. It lies along the W. shores of Lake Nyasa and to the S. of that lake, is approximately 520 m. in length, and has a land area of 37,374 sq. m. The S. portion is about 130 m. from the sea. The protectorate is bounded N. by Tanganyika Territory, W. by Rhodesia, S.W. and S.E. by

Portuguese East Africa, and E. by Lake Nyasa. There are two natural divisions, the one consisting of the W. littoral of Lake Nyasa, with the tablelands separating it from the basin of the Loangwa river and the districts between the watershed of the



Nyasaland arms

Zambezi and the Shire rivers on the W., and the other on the E., the districts of Lakes Chiuta and Chilwa and the Ruu, with the Shire highlands and Manje.

The modern history of Nyasaland dates from Sept., 1859, when Livingstone first reached the southern shores of Lake Nyasa. Livingstone was closely followed by various church missions, which have played an important part in its subsequent history.

The spheres of influence of Great Britain, Germany, and Portugal were defined by agreements made in 1890 and 1891, and the limits of the protectorate were settled by a proclamation of May 14, 1891; in the following spring a British protectorate was proclaimed over the countries adjoining Lake Nyasa. Before that time the territory was part of British Central Africa. From 1893 until 1907 it was known as the British Central Africa Protectorate, but the former name of Nyasaland Protectorate was revived in Oct., 1907. The administrative capital is at Zomba, but the chief town is Blantyre, on the Shire Highlands railway. The protectorate is administered by a governor, assisted by an executive council.

A large portion of the protectorate is mountainous or composed of lofty plateaux rising somewhat abruptly. The principal ranges are the Manje Mts., between Lake Chilwa and the river Ruu, of which the highest peak is 9,843 ft. in alt.; the Shire highlands lying E. of the Shire river, of which the highest portion is Mt. Zomba, 7,000 ft.; the Kirk range, W. of the Shire, reaching 7,000 ft.; the Angoniland plateau, at the S.W. end of the lake, reaching 8,000 ft.; and the Mangoche Mts. In addition to Lake Nyasa, there are three considerable lakes, Chilwa or Shirwa, 100 sq. m., Chiuta, 30 m. long, and the swampy Malombe; but the only important river is the Shire.

The most important products are cotton, tobacco, coffee, tea, chillies, rubber, rice, maize, vegetable oils, and soya beans. Most

travel by rly. to Port Herald on the river Shire and to Chindio on the Zambezi, and thence to the mouth of the Zambezi. In April, 1922, a railway line, 175 m. long, from Murrao, on the southern bank of the Zambezi, to Beira in Portuguese East Africa, was opened for traffic. This set up direct rly. connexion between Blantyre and Beira. On March 1, 1935, the great Zambezi bridge was opened, establishing unbroken communications between Nyasaland and Beira. This is the longest railway bridge in the world, 12,004 ft.

The various missions are mainly responsible for education in Nyasaland. The Government maintains the Jeanes training centre, but apart from that its function is to

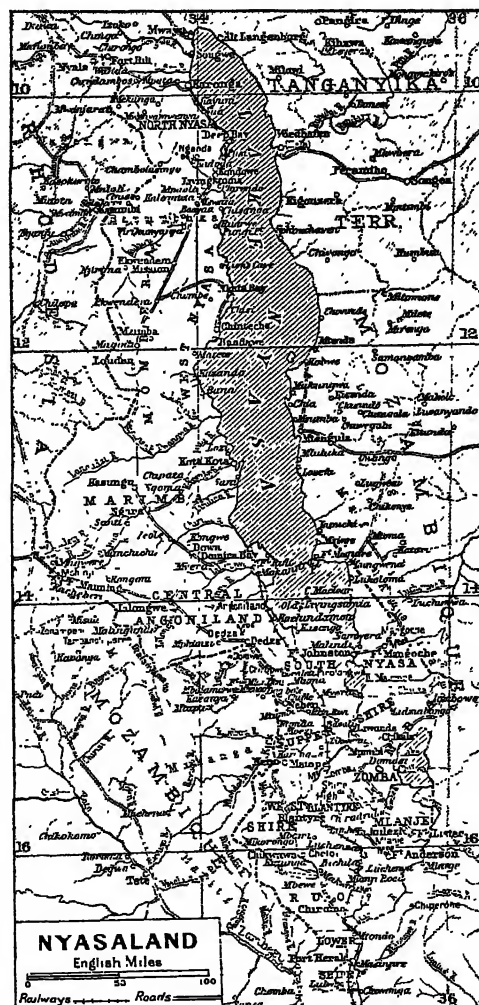
coordinate and advise. The enrolment at the African primary schools is about two-thirds of the children available, but only a small number reach the end of the course. There are elementary schools for European children, but it is considered unwise to keep European children in Nyasaland after the age of 11. They then usually go to S. Rhodesia, where the parents are assisted by substantial financial grants.

At the outbreak of the First Great War prompt action surprised and disabled the German steamer Hermann von Wissmann while on the stocks at Sphinxhaven, and gave the British command of Lake Nyasa. On Sept. 8, 1914, a British force, working N.,

attacked the enemy, whose main body had arrived simultaneously to attack Karonga. This German force was routed. In May, 1915, a naval detachment reached the protectorate, and as reports were received that the Germans were repairing the Hermann von Wissmann, a force went to Sphinxhaven on May 30, disabled the steamer, and captured a large supply of stores and ammunition. In the Second Great War Nyasaland was free from hostilities. Land area 36,829 sq. m. Pop. 2,033,697 (Europeans 1,948).

Bibliography. British Central Africa, Sir H. H. Johnston. 1897; Nyasaland under the Foreign Office, Duff, 2nd ed. 1906; Peace Handbooks No. 95, Nyasaland, 1921; Report on Tea Cultivation, 1933; Emigrant Labour Report, 1935.

Nyborg. Port of Denmark, on the E. coast of the island of Fünen. Lying 18 m. by rly. S.E. of



Nyasaland. Map of this British protectorate in the uplands of Central Africa

Odense and one hour by steam ferry from Korsør in Zealand, it has a deep and spacious harbour, and exports cereals. It has a Gothic church and an arsenal housed in an old royal residence. Founded in the 12th century, Nyborg was a fortress until 1867. Here in 1659 the Swedes were defeated by the Danes. Pop. 9,740.

Nygaardsvold, JOHAN (b. 1879). A Norwegian statesman. Born near Trøndhjem, he went to the U.S.A. in 1900, working as a farm labourer and railwayman. Returning to Norway in 1907, he was elected to the *storting* in 1916, and in 1928 became minister of Agriculture in the first Norwegian Labour govt. In 1935 he became prime minister, an office he held when the Germans invaded Norway in 1940. After the withdrawal of Allied troops from Norway, Nygaardsvold came to Great Britain with King Haakon and formed the Free Norwegian govt. in London. He returned to Norway as premier after the liberation, but after a short time retired from active politics.

Nyköping. A port of Sweden, capital of the län or govt. of Södermanland. Situated on a bay of the Baltic 52 m. direct (100 m. by rly.) S.W. of Stockholm, it has a good harbour and a ruined castle, destroyed by the populace in 1317. Nyköping has cloth and engine factories and exports grain and iron ore. One of the most ancient towns in the country, 15 national diets were held here in the 13th-15th centuries. Pop. 14,260.

Nylon. Generic name coined by the Du Pont Company of America to cover a series of synthetic linear polyamides. The materials were developed as the result of long-term research begun in 1928 by Dr. W. H. Carothers. In chemical structure they are similar to natural silk and wool, but they are obtained from coal which yields phenol, water which yields hydrogen, and air which yields nitrogen and oxygen. From these fundamentals are obtained dibasic acids such as adipic or sebacic, and diamines such as hexamethylene diamine. While the number of possible combinations of these materials theoretically runs into thousands, only about eleven types of nylon were at first developed.

The large-scale manufacture of nylon was started in the U.S.A. in 1940. Its production was rapidly expanded to meet an increasing demand for fibres and also for special plastics used during the Second Great War. To many

people, however, the word nylon became merely a synonym for super-fine fully fashioned stockings, but filaments have been used in the production of bristles for brushes and, made up into ropes, have been utilised for special high duty applications such as glider tow ropes and parachute harness.

The application of nylon as a mouldable plastic has been limited, though it has many advantages, being very light, having a specific gravity of 1.14 compared with 1.30 for cellulose acetate. The injection moulding of nylon calls for high temperatures since it melts at 450° F., and special precautions have also to be taken to deal with its high fluidity when melted. Nylon has a very low inflammability, and is resistant to water, most solvents, grease, oil, alkalis, and weak acids. Bearings made from nylon require no lubricant other than water. In solution the material is used in the production of films for special purposes, and for coating wires and fabrics.

Nymph (Gr. *nymphē*). In classical mythology, a localised nature spirit, regarded as a minor deity. Different groups of nymphs were sea and water nymphs, such as the Oceanids, the Nereids, and the Naiads; Oreads, or mountain-nymphs; Dryads and Hamadryads, or tree-nymphs. Temples were not built to them, but offerings of milk and honey were made in grottoes, at fountains, trees, etc. Anyone meeting a nymph became frenzied.

The word nymph is sometimes used for an insect in the stage of development before its last metamorphosis. See Insect; Larva.

Nymphaeaceae. A family of aquatic, perennial herbs. Natives of the temperate and tropical regions of the world, they have stout creeping rootstocks, and mostly floating leathery leaves. The flowers are solitary, with three or six sepals, three or more petals (often numerous), and many stamens. It includes the sacred bean (*Nelumbium*), water lilies (*Castalia*, *Nymphaea* and *Victoria*), etc.

Nymphomania (Greek, *nymphē*, a bride; *mania*, frenzy). State of excessive sexual desire in women due to disorder of the endocrine glands. More often met with is pseudo-nymphomania, which has a psychological origin. Women afflicted with it generally obtain less than the normal satisfaction from sexual intercourse; the urge which prompts their behaviour is (according to psycho-analysts) unconscious sadism, directed both

against their partners and themselves, with an equally unconscious desire to mutilate the partner.

Nyon Agreement. Nine-power "anti-piracy" agreement. A conference met at Nyon, Switzerland, in Sept., 1937, during the Spanish Civil War, to consider measures to check the attacks being made on shipping by submarines of unknown nationality. The adoption of an "anti-piracy" patrol was agreed by Gt. Britain, France, Russia, Turkey, Greece, Yugoslavia, Rumania, Bulgaria, and Egypt. Great Britain and France were to provide naval forces to patrol the Mediterranean. The others being responsible only for their own territorial waters.

Nyren. Name of two English cricketers. Richard Nyren came of a Scottish family, originally Nairn. He was settled in Hampshire by about 1750 when he founded the Hambledon club (see Hambledon). He kept the Bat and Ball Inn, on Broad Halfpenny, and looked after the adjoining ground. Left-handed and one of the finest bowlers of his day, he was also a good batsman. His son John (1764-1837), besides being a cricketer of repute, wrote *The Young Cricketer's Tutor*, comprising full directions for Playing the Elegant and manly Game of Cricket, 1833. John died at Bromley, June 30, 1837. See Cricket.

Nystad. Town and seaport of Finland. Called in Finnish Uusi-kaupunki, it is in the district of Abo-Björneborg (Turku-Pori), on the Gulf of Bothnia, 40 m. N.W. of Turku. It has a good harbour and docks, and a considerable trade. The port has direct connexion with the Åland Islands. The peace of Nystad, 1721, gave Russia extensive Baltic territories.

Nystagmus. Oscillating movement of the eyeball, usually lateral, but sometimes vertical or rotatory. The most frequent form is coal-miner's nystagmus, which is due primarily to working in a dim light. It improves if work in the mine is given up. Miners working in open mines to which daylight penetrates do not contract nystagmus. It is a symptom of various nervous disorders, particularly the affection known as disseminated sclerosis. Nystagmus following disease of the nervous system is practically incurable. See Eye.

Nyx. In Greek mythology, the personification of night, called Nox by the Romans. Daughter of Chaos, the primal void, and mother of Aether (Heaven) and Hēmera (Day), she is represented as a winged goddess in a chariot.

IN its direct descent from the Phoenician (100 B.C.) letter *ayin* (meaning eye), the letter O, alone among the letters of the alphabet, has undergone virtually no change. Such departures from the perfect circle as are found in ancient examples are due to the difficulty of inscribing a circle in stone; such variations in its representation range from the ellipse to the diamond. The Greeks were the first to call the letter by the sound for which they made it the symbol. But they also differentiated between the long o sound and the short o sound, inventing the modified symbol Ω to represent the former. The two letters o and Ω



were known respectively as *o mikron* (small) and *o mega* (large). The Roman alphabet, having adopted the o before the introduction of the Ω retained the one form for both sounds. Classic Roman inscriptions introduced certain refinements. For example, in formal inscriptions

it was found that if the letter were proportionate to the other letters its circular shape gave it undue prominence, and it was therefore made relatively smaller, raising its base slightly above the base level of the rest, a device that was followed in formal MSS. even as late as the Middle Ages.

O Fifteenth letter and fourth vowel of the English and Latin alphabets. As with e, it is impossible to give any definite rules for its various sounds and combinations. Its two chief values are long o, as in *dote*, short o, as in *dot*, which is really the *au*, *aw* heard in *call*, *bawl* shortened. It equals short u in *another*, and oo in *prove*. It combines freely with other vowels. *Oa* equals long o in *boat*, *moat*, but not in *abroad*, *board*; *oe* equals e in words of Greek origin, and is now generally so spelt, as in *economy*, *ecology*; in other words it equals long o as in *hoe*, *roe*. *Oi*, *oy* in *boiler*, *boy* really equals *aw* plus i; oo is long in *boon*, and short in *wood*, and in words such as *blood*, *flood* equals short u. *Ou* presents a great variety of sounds. See Alphabet; Phonetics.

Oahu. The Hawaiian island on which Honolulu stands. Area, 589 sq. m. See Hawaii; Honolulu.

Oak (*Quercus*). Large genus of trees of the family Fagaceae, including about 300 species, natives of the N. temperate regions, Indo-Malaya, the Pacific coasts, etc. The typical species is, of course, the British oak (*Q. robur*) whose trunk may be 120 ft. high, with a girth of 60-70 ft., covered with thick rugged bark, which cracks both vertically and horizontally. The branches are massive and tortuous, and in the open spread widely with a downward tendency, producing a dome-shaped mass. The oblong oval leaves are arranged spirally, and their edges are cut into variable lobes. The minute flowers are green and inconspicuous; the fruit nut is known as the acorn (*q.v.*).

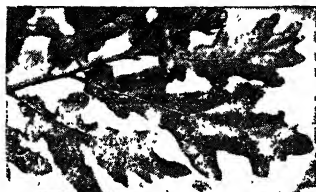
Two well-marked British forms of this species are given specific rank by some authorities. In one of these (*sessiliflora*) the leaves have a distinct but variable stalk, and the acorns are seated almost directly on the twig; in the other (*pedunculata*) there is little or no leaf-stalk, and the acorns have long, slender stalks. Several exotic oaks have been introduced to the U.K., and are frequently seen in parks and gardens. The most common are the holm oak (*Q. ilex*) and the Turkey oak (*Q. cerris*) both from S. Europe. The latter was introduced about 1735, and is distinguished by its pyramidal form, its narrower, more acutely lobed leaves, and the long, curled scales of the acorn cup which give it a mossy appearance. Another S. European oak well established in British parks is the



Oak. Specimen of the British oak tree. *Quercus robur*, in full leaf

cork oak (*Q. suber*), and a well-represented N. American species is the dyer's oak, whose large leaves turn orange or dull red in autumn. N. America has over a score of oaks. Several besides British oak yield bark suitable for tanning.

Although the fine-grained, hard oak timber has lost much of its former importance through the introduction of steel girders and framing in structural work, and



Oak. Leaves of a variety of the Turkey oak, *Quercus cerris*

the competition of the more easily worked coniferous woods, it is still employed where endurance and the bearing of strains are needed; also for cabinet making, furniture, and panelling. For this purpose oaks have to be grown closely in woods to produce great length and equal thickness of trunk, and to discourage the production of lateral branches—which were in request in the era of wooden ships. Propagation is effected by the acorns. British oaks thrive best in rich loam.

The British oak is a tree of great longevity, as shown by many existing ruins of former giants, such as the Greendale oak at Welbeck, variously estimated by experts as being from 700 to 1,500 years old; and the Cowthorpe oak near Wetherby, Yorks, considered to have survived for 1,800 years. The tree does not produce any acorns until between 60 and 70 years old, and it does not pay to cut it for timber until it is in its second century. See Forestry.

OAK FINISHING. The contemporary finish of oak furniture and woodwork synchronise with the modern art movement. Mouldings, carving, inlay, and other embellishments being discarded in favour of simple design, there must be alternative attraction. If the wood is not painted, the eye must be pleased by its natural beauty. The demand that the wood shall not be hidden by layers of polish is sound aesthetically and represents a reaction against the decadent period of the late 19th century. Oak lends itself specially to this idea.

Theoretically, unpolished oak woodwork is ideal, but in practice the surface soon becomes soiled, so needs protection.

Polishing with raw linseed oil probably gives the best results, but there are difficulties. The oil being rubbed in with a clean white rag, it takes about a month to dry, and the process must be repeated about five times. It is not wise to oil veneered woodwork. For wax polishing, white wax (not paraffin or candle wax) or beeswax is shredded, placed in a jar, and covered with turpentine. The jar having stood for 24 hours, the mixture is rubbed into the grain with a piece of white rag. Applications are made every three or four days, and about four coats should be sufficient. If the process is continually repeated, the grain will eventually be entirely levelled up and the beauty of the wood impaired. While white wax has little effect on the colour, beeswax gives a warmth of tone.

The usual commercial method is to apply one or two thin coats of french polish. If the finish is to be in the natural colour of the wood, the polisher treats the light parts with extremely weak stain before applying the polish. In the finishing process known as weathered oak, the grain pores are filled in with lime before french polish is applied. Japanese oak is best suited for the process, on account of its small grain pores due to slow growth, combined with rich colour.

Oak Apple. Popular name for the growth on an oak, properly termed Oak Gall (*q.v.*).

Oak-Apple Day. Name given in England to May 29. The birthday of Charles II in 1630, and the day in 1660 on which he rode into London at the Restoration, it was celebrated by royalists, who decorated their houses with branches and leaves of oak, so commemorating also the king's escape from the parliamentary soldiers searching for him after the battle of Worcester, Sept. 3, 1651, when he hid with Colonel Careless in the oak at Boscobel, near Donington, Salop. Oak-apple day is still observed in many parts of England, notably at the Royal Hospital, Chelsea, as Founder's Day, when the statue of Charles II is decorated with oak-leaves and solemnly saluted.

Oakengates. Urban dist. and market town of Shropshire, England. It is 13 m. by rly. E. of Shrewsbury. The chief industries

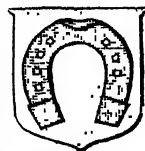
are light engineering and steel and iron works. Market day, Sat. Pop. 10,860.

Oak Gall. Abnormal growth of the surface tissues of the oak caused by attacks of gall-wasps of the family Cynipidae, order Hymenoptera. The female gall-wasp pierces the tissues and deposits her eggs in the punctures, and swelling of the



Oak Gall. Marble or bullet galls affected part results. These attacks give rise to such familiar objects as spangle galls on the leaves, oak-apple and marble galls on the buds, and galls on the roots. Usually there are two generations of a gall-wasp annually, and the resulting swellings are different. Wasps emerging from the oak-apple galls seek the roots where other galls are produced; wasps from these last ascend the tree and there cause the oak-apple galls of the following year.

Oakham. Market town and co. town of Rutland, England. It is 94 m. N. by W. of London and 9 m. S.E. of Melton Mowbray, having a rly. station. The principal building is the church of All Saints.



Oakham arms

The banqueting hall of the castle built in the 12th century, is used for county business. Of interest, too, are Floro's House and the butter cross. The main industries are the manufacture of boots and shoes. Oakham is also a hunting centre. The lord of the manor has the right to claim a horseshoe from any peer passing for the first time through the town, and there is a collection of these in the castle hall. Market day, Mon. Pop. 3,191.

Oakham school was founded in 1584 by Archdeacon Robert Johnson. Its constitution was remodelled in 1875, and it is now a public school with accommodation for about 300 boys. The old school still stands with additional modern buildings.

Oakland. City of California, U.S.A., the co. seat of Alameda co. A residential place opposite San Francisco, on the E. shore of San Francisco Bay, it is served by rlys. and has tram and ferry services. With a sub-tropical climate, it is surrounded by

gardens and vineyards. Educational institutions include S. Mary's R.C. college and a Congregational seminary. Oakland has shipbuilding yards, fruit canneries, flour and planing mills, carriage works, and cotton, iron, steel, and leather manufactures. Until the American defeat of Mexico in 1848 and the "gold rush" in the same year, cattle grazed on a Spanish-owned ranch on the site of the city. From a yard supplying timber to the rising city of San Francisco, it developed into a suburb from which 30,000 people travel daily to the metropolis. Since 1936 an 8-mile double-deck steel bridge with six traffic lanes has connected Oakland with San Francisco. Pop. 302,163.

Oak Ridge. Atomic fission plant in the Tennessee valley, U.S.A. Covering 59,000 acres, it was established by the govt. in 1943 as a pilot plant to produce plutonium for the manufacture of the atomic bomb. The site was chosen for its proximity to the T.V.A. power and water facilities and for its remoteness from the coast. Officially known as the Clinton engineer works, Oak Ridge became the largest division of the atomic bomb project, and at the peak of war-time production in 1945 had a pop. of 78,000.

Oaks, THE. English horse-race. It is run at Epsom, normally on the Friday of Derby week. The course is the same as for the Derby, and the race is for fillies three years old. The Oaks is the name of a house near Epsom. In 1778 it was the property of the earl of Derby, and it was during a dinner party there that the earl and his friends decided to found the race. During both Great Wars the race was run at Newmarket. See Horse-racing.

Oaksey, GEOFFREY LAWRENCE, BARON (b. 1880). British judge. Son of the 1st Baron Trevethin, he was educated at Haileybury and New College, Oxford, and became a barrister at the Inner Temple in 1906. Recorder of Oxford, 1924-32, and for long counsel to the Jockey Club, he was made a judge in the king's bench division, 1932, and lord justice of appeal in 1944. Lawrence was president of the international tribunal during the Nuremberg trials (q.v.), 1945-46. He was given a peerage in 1947, and made lord of appeal in ordinary. He was chairman of a committee on police conditions, 1948-49.

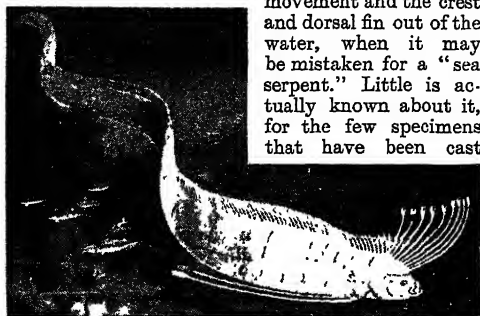
Oakum (A. S. *acumbe*, off-combings). Loose hempen fibre made

from old ropes, used for caulking seams and stopping leaks on ships, and as an emergency surgical dressing. Tarred ships' ropes make the best oakum. Picking oakum was formerly a common employment in prisons and workhouses. White oakum is made from untarred ropes. Tow, the inferior parts of the flax fibre which separates out during the process of hankling, was formerly known as oakum.

Oamaru. Town and port of South Island, New Zealand. Situated 152 m. S.W. of Christchurch, and 78 m. N. of Dunedin by rly., it exports wool and grain. The centre of a rich agricultural district, it has freezing works and woollen mills. Its limestone is a useful building stone. Pop. 7,476.

Oar. Implement for moving a boat. It consists of a long, slender piece of wood, with a handle at one end and a blade at the other, the blade acting as a lever when in contact with the water. Each oar rests in an oarlock or rowlock. In early times galleys were propelled

The name was suggested by the long, slender ventral fins expanded at their extremity. North Sea fishermen know the fish as King of the Herrings. On the rare occasions when it comes to the surface it swims with an undulating movement and the crest and dorsal fin out of the water, when it may be mistaken for a "sea serpent." Little is actually known about it, for the few specimens that have been cast



Oar Fish. Specimen of the deep-sea fish called by North Sea fishermen King of the Herrings

ashore have broken up rapidly. Allied, some say identical, is the ribbonfish (*R. banksii*).

Oarweed (*Laminaria digitata*). Large olive seaweed of the Laminariaceae. It has a long, thick, round stem, with claw-like false roots, which attach it to the rocks. The thick, leathery, leafy portion, at first undivided, splits up into a number of segments. The whole plant is 15 ft. long, and grows on the rocks below ordinary low-tide



Oasis. Scene at the Oasis of Tonggourt in the Sahara

by slaves sitting in rows. The implements used for propelling a light boat are called sculls; the sculler uses two of them, whereas the oarsman proper uses only one, another oarsman rowing on the other side of the boat. See Eight; Galley; Rowing; Sculling.

Oar Fish (*Regalecus glesne*). Remarkable deep-sea teleostean fish of the family Trachyteridae. It is found in the Atlantic, Mediterranean, and North Sea, off the Faroes, Scotland, Norway, and N.E. England. The compressed, elongated, and scaleless body may be as much as 20 ft. long, with soft bones, a small mouth without teeth, and a dorsal fin that extends from behind the head to the imperfect tail. The first few rays of this fin are very long, with dilated tips, forming a conspicuous crest.

level. Tangle and sea-girdles are popular names for this alga.

Oasis. Fertile tract in a desert. The fertility of oases is due to water near the surface, either in depressions, so that the sinking of wells will give permanent supplies of water, or along the course of wadies, or, as with the Nile, along the banks of permanent waterways passing through deserts. By cultivation they can be made to produce a wide range of crops. The date palm groves of Saharan oases are famous. See Desert.

Oast House. Kiln in which hops or malt are dried. They are seen especially in Kent. See illus. p. 6164; see also Hops.

Oates, LAWRENCE EDWARD GRACE (1880-1912). British explorer, born on March 17, 1880. He was gazetted to the Inniskilling



Oast House. Three oast houses, or kilns near Sittingbourne, Kent.
See page 6163

Dragoons, and served in the S. African War and in India and Egypt. He joined the Antarctic Expedition in 1910, and was one of the sledge-party who accompanied Scott



L. E. G. Oates,
British explorer

in his final dash for the South Pole. On returning the party was storm-bound and on his birthday, March 17, 1912, Capt. Oates, crippled by frost-bite, went out alone into the blizzard to die rather than be a burden to his starving comrades. See Antarctic Exploration. Consult A Very Gallant Gentleman, L. C. Bernacchi, 1933.

Oates, Titus (1649 - 1705). British conspirator and perjurer. He was born at Oakham, the son of an Anabaptist minister. Although expelled from Merchant Taylors' and sent down from Cambridge without taking a degree, he received ordination, but shortly afterwards was imprisoned for perjury. In 1677 he joined the R.C. Church, and went to the English Jesuit college at Valladolid, whence he was expelled, as also from St. Omer.

In 1678, Oates was in London concocting details of an R.C. "plot" to kill the king, invade Ireland, and indulge in a general massacre of Protestants. He duly revealed it to Sir Edmund Godfrey, a justice of the peace, who was found dead shortly after. For a time Oates was a popular idol.



Titus Oates,
British conspirator
After R. White

Nearly three dozen people were executed through his machinations. At last, in 1684, he was arrested for calling the duke of York a traitor, and after the duke's accession as James II, was tried, and sentenced to a heavy fine, whipping, and imprisonment for life, and annual exposure in the pillory. After William III came to the throne, Oates was released, and enjoyed a pension. He died July 12, 1705. Consult Liars and Fakery, P. W. Sergeant, 1926.

Oates Land. That part of South Victoria Land, Antarctica, lying between King George V Land (q.v.) and Cape Adare in lat. 70° S. and long. 160° E. See Antarctic Exploration.

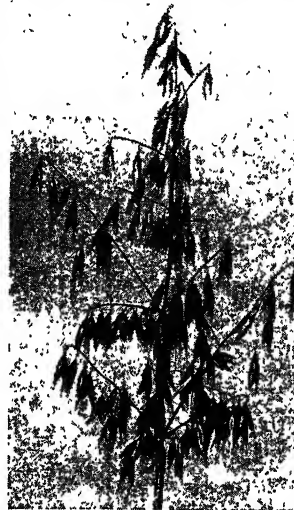
Oath. In law, an appeal to God to witness the truth of evidence given. In English courts a witness must take an oath before giving evidence unless he has no religious belief or the taking of an oath is contrary to his belief, in which cases he may affirm. (See Affirmation.) A Christian takes the New Testament and a Jew the Old Testament in his uplifted hand and swears by Almighty God to speak the truth, the whole truth, and nothing but the truth. Until 1909 the English form required a "corporal" oath, i.e. the touching of some object, which had for long come to mean kissing the testament. This was strongly opposed by the medical profession on health grounds, and they took advantage of a provision introduced in 1888 and primarily intended for Scottish witnesses in England by which any person could insist on the Scottish form of oath which does not involve kissing the book. Any extension of this was at first bitterly opposed by the courts, but finally its legality was admitted. A witness may still if he wishes use the Scottish form. A witness who is neither Christian nor Jew may take an oath in any form binding on his conscience; thus a Mahomedan may swear upon the Koran.

There are extra-judicial oaths. The principal of which is the oath of allegiance, which has to be taken by M.P.s, ministers of the crown, clergymen, naturalised aliens, etc. See Coronation Oath; Perjury.

Oatlands. Estate near Weybridge, Surrey, England. Here Henry VIII built a magnificent palace, surrounded by a large hunting park. After the time of Charles I it fell into decay. The estate came later to the earl of Lincoln, who, about 1720, built another house in the park, on a different site. This was sold in

1794 to the duke of York, son of George III, who rebuilt the house, which had been damaged by fire in 1793. In 1857 the house became an hotel. The grounds contain a remarkable grotto, and a cemetery wherein the duchess of York buried her domestic pets.

Oats. Cultivated cereal. Varieties used in Great Britain belong mainly to the species *Avena sativa*,



Oats. Heads of *Avena sativa*

the origin of which is a matter of speculation. In Wales and in some of the Western Isles, varieties of *A. strigosa* are grown in regions of high rainfall and low fertility. Oats require a much cooler and wetter climate than barley and wheat, and so are extensively grown in N. and N.W. England and in Scotland, Wales, and N. Ireland. Oats prefer a less alkaline soil than barley, and too much lime in the soil is harmful to them. The greater portion of the British oat crop is spring-sown, but the use of autumn-sown varieties is increasing, especially in the E. and S.E. Cultivation of oats is similar to that of other cereals, but as they suffer more severely from spring drought and insect pests, early sowing is still more imperative.

Oats may be sown at almost any position in the crop rotation, but preferably on soils that are not too rich. As they need abundant moisture in early stages, any condition which leads to a check in growth in the spring should be avoided. Artificial fertilisers may be applied in a mixture immediately before sowing, at the rate of 1 cwt. sulphate of ammonia or 1 cwt. nitrate of lime, 3 cwt.

superphosphate, and 3 cwt. kainit per acre. Yield of grain varies greatly with the district, but averages 40-60 bushels (15-22 cwt.) per acre, with about 25-30 cwt. straw. As oats are not taken to the same degree of ripeness as barley or wheat, this straw usually contains valuable nutriment for stock feeding.

In composition the true kernel of oats, *i.e.* the grain separated from the husk, is as rich in protein as wheat, but contains three to four times as much oil; this in conjunction with about 60 p.c. carbohydrates makes the oat grain a well balanced and safe food for livestock. Its feeding value is modified by the composition of the husk, which contains a high proportion, sometimes one-third by weight, of indigestible fibre. The proportion of husk to kernel varies, the best oats containing 20-23 p.c. husk, while inferior sorts often have over 30 p.c. Oats are used by human beings in the form of oatmeal, which is the kernel ground, and as flaked oats, which are the kernels crushed and sometimes partially cooked.

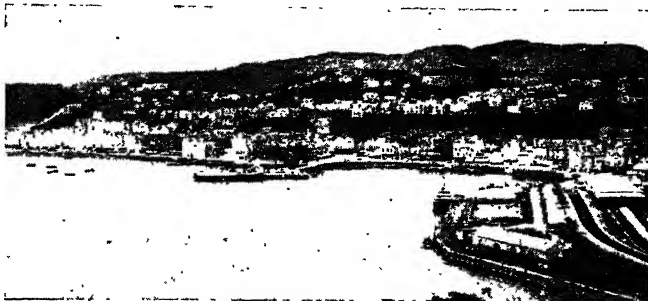
Oaxaca. Maritime state of S. Mexico, bounded S. by the Pacific Ocean. It is largely covered by the wooded spurs of the Sierra Madre. There are numerous small streams. Sugar, coffee, cotton, tobacco, and cocoa are cultivated, and cattle rearing is carried on. A rly. extends from the N. to the capital, Oaxaca; a second line in the E. crosses the isthmus of Tehuantepec to Puerto Mexico on the Gulf of Campeche. There is a fine highway from the capital to Matamoros. Area, 36,371 sq. m. Pop. 1,192,794.

Oaxaca. Capital of the state of Oaxaca, Mexico. It is about 100 m. N.W. of Tehuantepec. It contains a massive cathedral, an institute of arts and sciences, and a natural history museum. Jewelry, cotton goods, chocolate, and fibre are manufactured. Oaxaca has rly. and road communication with Mexico city. On Monte Alban, near by, and on other sites in the valley, are remains of ancient Mexican civilization. Pop. 29,306.

Ob or **OBI.** River of Asiatic Russia. It is formed by the union of the Biya and Katunya, in the W. Siberian region, in the little Altai range. It first flows N., next N.W. to its junction with the Irtysh below Samarovsk, then N., and below Salekhard, turns sharply E. and discharges into the gulf of Ob, an arm of the Arctic Ocean, 600 m. long and 60 m. broad. The length

of the Ob is 2,100 m. or (including the Irtysh) 2,500 m.

Obadiah. Minor prophet of the O.T. In the single chapter of his book his predictions include the complete ruin of Edom, and also the coming of the Day of the Lord.



Oban, Scotland. The town and harbour of this Argyllshire seaport

Oban. Mun. burgh, seaport, and watering-place of Argyllshire, Scotland. It is 62 m. directly N.W.

of Glasgow, but much farther by rly. and bus. A great tourist centre, it has a splendid harbour, protected by the island of Kerrera. There is a modern R.C. cathedral. Oban was made a burgh in 1811. Market day, Wed. Pop. 5,791.

Obbligato (Ital.). Instrumental accompaniment to a vocal or solo line in a musical composition. This is written out by the composer or arranger instead of being left to the discretion of the performer. Favourite examples have been scored for flute or cello in songs, while there is a harp obbligato to the bass aria Quoniam in Bach's Mass in B minor.

Obeah or **OBI.** West African term denoting a form of negro witchcraft practised in some W. Indian islands and the southern United States. The obeah-man or obeah-woman employs incantations, and charms such as bottles containing feathers, pebbles, plants, and rags, sometimes resorting to poison. *See* Fetishism; Juju; Magic; Voodoo.

Obelisk (Gr., spit for roasting). Tapering pillar-stone. In ancient Egypt it was usually a four sided monolith of pink sye-

nite, with a base-width one-tenth of its height, and a copper-sheathed pyramidal apex, and bore incised hieroglyphs upon each face. Obelisks stood in pairs before temple portals, indicative of sun-worship. This colossal type was introduced



Oban arms

by Senusert I (XIIth dynasty). One remains at Heliopolis (Jer. 43); others, once there, are now in New York and London. One of Hatshepsut's at Karnak still stands. The tallest extant, 105½ ft., is in Rome; Paris has one of Rameses II from Luxor. One brought in 1815 from Philae to Kingston Lacy, Dorset, assisted Champollion to decipher the hieroglyphs. *See* Cleopatra's Needles; Heliopolis; Karnak; Manishtusu; Pylon; Shalmaneser.

Oberammergau. Alpine village in Upper Bavaria, Germany. In the Ammer valley, 45 m. by rly. S.S.W. of Munich, it is 2,800 ft. high. It is world-famous for its Passion Play (*q.v.*), held since 1634, at roughly ten-year intervals, in fulfilment of a vow made by the inhabitants of the village during a plague. The performances were cancelled during the First Great War, and again during the Nazi period, after which some of the



Oberammergau, Bavaria. Stage and crucifixion scene of the Passion Play

actors had to undergo denazification trials. Previously playing in front of the fine rococo church (1736-42), the actors, in ordinary life farmers and wood-carvers, secured in 1830 a large open-air scene seating 5,000 spectators under cover. A 40-ft. sandstone Crucifixion group, gift of Louis II in 1871, and the neighbouring Benedictine monastery of Ettal, are other attractions of the place, which lies in a region of winter sports. Pop. 2,341.

Oberhausen. Industrial town of Germany. It is situated near the N. bank of the Rhine, 44 m. by rly. N. of Cologne, and, although founded only in 1845 and with urban rights since 1875, it was a highly important industrial centre, with some of the greatest iron and steel works of the Ruhr area. Almost linked with Essen in the E., and Duisburg in the W., it was at the heart of the heavy industry of the Ruhr, and as such, was almost wiped out by the bombing attacks of the Second Great War. In spite of its condition, its pop. in 1946 was still 174,096.

Oberlin, JEAN FRÉDÉRIC (1740-1826). Alsatian pastor and philanthropist. Born Aug. 31, 1740, at Strasbourg, he studied at the university, and in 1767 became pastor of Waldbach, on the borders of Alsace-Lorraine. Here he built school-houses, introduced improved methods of agriculture, laboured devotedly to improve the well-being of the people, and preached a mystical piety. Awarded the medal of the legion of honour, 1819, he died June 1, 1826.

Oberon (Fr. *Auberon*, Ger. *Alberich*, ruler of the elves). King of the fairies. He appears as king in the Charlemagne romance of Huon of Bordeaux, and as the dwarf, Alberich, of the Nibelungenlied, long before he was anglicised by Shakespeare in *A Midsummer Night's Dream* (q.v.).

Oberon. One of the four satellites of the planet Uranus. Discovered by Herschel in 1787, it is fourth in order of distance from the planet. It is probably about 600 m. in diameter and revolves in its orbit, which is 729,000 m. across, in just over 13 days 11 hours. Like other satellites, its orbital plane is remarkable in being inclined at 82° to the ecliptic.

Oberon, MERLE (b. 1911). British film actress. Estelle Merle O'Brien Thompson was born Feb. 19, 1911, in Tasmania, and educated at Bombay and Calcutta. After appearing in cabaret at the Café de Paris, London, she met Alexander Korda (to whom she was married, 1939-45) and was in his first film, *Wedding Rehearsal*, 1933, then played Anne Boleyn in *The Private Life of Henry VIII*. An exotic appearance gave her distinction in many films, e.g. *The Scarlet Pimpernel*, 1935; *The Dark Angel*, 1936; *Wuthering Heights*, 1939; *Forever and a Day*, 1943; *Temptation*, 1947.



Merle Oberon,
British actress

Obesity. Excessive deposit of fat in the body. Corpulence, or general overgrowth of fat in the body, results from some disorder of nutrition, probably due to excessive absorption of the fat-producing constituents of food, to incomplete combustion of fat in the tissues, or to retention of fluid in the tissues. Some persons remain thin in spite of being large eaters, and others put on weight though they take food sparingly. Heredity is a marked factor. Excessive obesity leads to shortness of breath, interference with the action of the heart, and difficulty in walking. Corpulent persons should avoid taking too much food, and particularly should reduce those articles of diet which contain much starch or sugar. Several diets and treatments have been advocated for lessening obesity. See Diet.

Obey, ANDRÉ (b. 1892). French writer. Born at Douai, May 8, 1892, he was educated there and at Lille university, and after serving in the First Great War lived in Paris, where he became a critic. A novel, *Le Joueur de Triangle*, 1928, was awarded the Théophraste Renaudot prize. Obey founded his reputation as a dramatist with *Noé*, 1931 (produced, as *Noah*, at the New Theatre, London, 1935), and *Le Viol de Lucrèce*, 1931. Other plays included *La Bataille de la Marne*, 1932 (Brioux prize); an adaptation of Shakespeare's *Richard III*, 1933; *Loire*, 1933; *Don Juan*, 1936.

Obiter Dictum (Lat., said by the way). Legal phrase denoting an opinion expressed incidentally by a judge in the course of his judgement, which is not an in-

tegral part of the judgement, i.e. is not necessary for the decision of the case. Though it may be valuable, owing to the learning of the judge who pronounces it, a dictum which is merely obiter is not binding in any other court of the same or inferior jurisdiction. See also Birrell, Augustine.

Object. In grammar, a word, phrase, or clause used substantively in immediate dependence on a verb, as denoting that on or toward which its action is directed. As an example, in the sentence "I killed him," him is the object of the verb killed. In optics the object glass is the lens or system of lenses, also known as the objective, placed at the end of a telescope or microscope nearest the object being examined. In philosophy, object is the antithesis of subject, and denotes the totality of external phenomena observed by the individual.

In military phraseology, an object is any prominent feature of landscape which can be used as an aiming point, or as zero point in compiling a visual range card for field artillery. In this sense, object is distinct from objective, which describes any position the capture of which is the aim of a military operation.

Object teaching is a method of instruction in which illustrative objects are employed, e.g. as in a kindergarten. The object ball in billiards, pyramids, etc., is the ball which is designed to be hit by the cue ball, i.e. the ball which is being directly aimed at. In medicine, object blindness is a condition in which objects may be seen distinctly, but are of no significance to the mind. In astronomy, object metal is the principal mirror of a reflecting telescope.

Oblates (Lat. *oblatus*, offered, part. of *offerre*, to offer). Word used in various monastic senses. Originally oblates were children brought to the monastery by their parents and dedicated to the religious life. Later they were lay brothers. Still later, they were associate members, sometimes known as confratres or tertiaries, who observed a simple rule of life, and devoted themselves and their fortunes to the service of the community. Henry VI of England was a confrater of the abbey of S. Edmundsbury. In the R.C. Church, the title oblates has been assumed by congregations of priests devoted to preaching, conducting missions, and education, and the female congregations devoted to high school teaching.

Obligation. Term used in English law. It describes any act or instrument whereby a person, called in England the obligor, is bound by law to do or refrain from doing something. The person in whose favour the obligation runs is called the obligee.

Obock OR **OBOK.** Port on the Red Sea, in French Somaliland. Situated on the N. shore of the Bay of Tadjoura, opposite Jibuti (q.v.), it was acquired by France in 1856, officially annexed in 1862, but not occupied until 1884. Formerly it was an independent sultanate.

Oboe. Italian form, and that most commonly used, of the name of the double reed musical instrument, the hautboy (q.v.).

Obolensky, ALEXANDER, PRINCE (d. 1940). Russian-born English footballer. From Trent College he went to Brasenose College, Oxford, and made his mark as a Rugby wing three-quarter. Naturalised in 1936, he became an English international player of exceptional speed and skill. A pilot officer in the R.A.F., he was killed at the age of 24 on March 29, 1940, when his machine crashed in East Anglia.

Obolus. Ancient Greek silver coin alloyed with copper. Six obols made a drachma (q.v.). An obol, traditionally placed in the mouth of a Greek corpse, was Charon's fare for rowing the soul of the departed across the Styx.

Obregon, ALVARO (1880-1928). Mexican president. Born in Sonora, he became the leader of a troop which helped to suppress Orozco's rebellion. In 1913 he joined Carranza, defeating Huerta's forces at Santa Rosa. In command of the Constitutional army, he won several battles and entered Mexico City, Aug. 15, 1914. During this period of unrest Obregon had made himself Mexico's most prominent soldier. After Carranza's murder a provisional president was elected, but he soon gave way to Obregon, who, the most powerful man in the country, was elected without opposition in 1920. He remained in office until 1924, when Calles became president for four years. Obregon was chosen to succeed him, but before he could assume office he was murdered, July 17, 1928.

Obrenovitch. Former ruling dynasty of Serbia. Its founder was Milosh Obrenovitch (1780-1860), elected prince of Serbia in 1817. The Obrenovitch rule saw the emergence of Serbia as a kingdom independent of Turkish

domination. For nearly a century there was rivalry between the dynasty and that of Karageorgevitch, and the last Obrenovitch to occupy the throne, Alexander I (1876-1903), was assassinated with his queen, June 11, 1903. See Karageorgevitch.

O'Brien, KATE (b. 1897). Irish writer. Born at Limerick, Dec. 1897, she was educated at a convent there and at Dublin university. She made her reputation as a novelist by the finely written *Without My Cloak*, 1931, which gained the Hawthornden and the James Tait Black prizes. There followed *Mary Lavelle*, 1936; *Farewell Spain* (travel), 1937; *Pray for the Wanderer*, 1938; *English Diaries and Journals*, 1943; *That Lady*, 1946. Her plays included *Distinguished Villa* (Aldwych Theatre, London, 1926), *Ante Room* (Queen's, 1936), and *The Last of Summer* (Phoenix, 1944).

O'Brien, WILLIAM (1852-1928). Irish journalist and politician. Born Oct. 2, 1852, he became a



William O'Brien,
Irish journalist
M.P.

reporter for the *Cork Daily Herald*. In 1880 he founded *United Ireland*, a paper of advanced Nationalist views. Indefatigable in working for the Irish cause, he was nine times prosecuted for political offences and spent over two years in prison. Nationalist M.P., 1883-95, and member of the land conference of 1903, he advocated a policy of conciliation and toleration, founding the All-for-Ireland league. M.P. for Cork city from 1910, he withdrew from parliament at the general election in 1918. He died Feb. 25, 1928.

O'Brien, WILLIAM SMITH (1803-64). Irish politician. Born Oct. 17, 1803, son of a landowner in Clare, and educated at Harrow and Cambridge, he became M.P. for Ennis in 1828, and represented Limerick, 1835-48. In 1843 he joined O'Connell's association for the repeal of the Union, but seceded in 1846 and founded the Irish Confederation, with a more violent policy. When the Habeas

Corpus Act was suspended in Ireland in 1848, O'Brien attempted an armed rising which failed. He was sentenced to death, but the penalty was commuted to transportation to Tasmania. His health giving way, he was released in 1854. He died June 18, 1864.



Obscenity. In English law, conduct or publications tending to corrupt or deprave public morals. Such conduct or publication is an offence. Anybody publicly exhibiting obscene books or drawings is liable to a fine of 40s. or 14 days in prison. By the Indecent Advertisement Act, 1889, it is an offence, punishable by a fine of 40s. or a month's imprisonment, to exhibit, or affix, or offer to any member of the public in a public place any obscene picture or printed or written matter. An obscene libel is indictable at common law. To send through the post a package bearing on the outside obscene words, designs, etc., is an offence under the Post Office Act, 1908, and is punishable by a fine not exceeding £10, or imprisonment with or without hard labour not exceeding 12 months.

Obscurantist. Term applied derisively at the revival of learning to the clerical opponents of learning and education. It appears to have gained currency through the publication in 1515 by Ulrich von Hutten's circle of the *Epistolae obscurorum virorum*, a satire on certain monks of Cologne who wished to destroy all Rabbinical literature. Obscurantism is a term often applied by their opponents to the supporters of traditional beliefs in theology and politics, especially to those who desire the suppression of what they consider subversive teaching, such as modernism, republicanism, free thought, etc.

Observation. The discriminate and retentive mental registration of things and happenings in the outer world. The faculty of accurate observation is a preliminary condition of science, and is of incalculable value in life. When the faculty of observation is highly developed, there are three elements or components which may be distinguished, though they are in reality inextricably intertwined.

(a) There is sensory acuteness—an eye to see. Many children have an almost photographically precise

observational power, which is partly an inborn gift, like a musical ear, but is also an expression of wide interests and inquisitiveness, and of a mind whose receptivity has not been dulled by the trivial, or overloaded with a plethora of pictures. Even when there is no special gift of observing, the average capacity is usually there, and both educational experiment and everyday experience show that this can be greatly developed. Early practice in recognizing flowers and birds, or analysing the jetsam of the shore and the stones by the wayside, educates the power of precise seeing.

(b) Inseparable from sensory acuteness is the power of clear-cut perception, i.e. of building-up lucid mental pictures of what is seen. This implies discrimination, knowing what one is looking at, the introduction of a more definite intellectual element into the sensory photograph. As a matter of fact, perceptions continually blend with our sensations. In perception we see the different parts of a thing making up a related whole, and we see this whole in relation to other parts of the picture. The very beginning of a knowledge of the outer world is a process of selecting from our thought-stream certain groups of vivid sense-impressions, and if we are to go on to know, the process of selecting must continue.

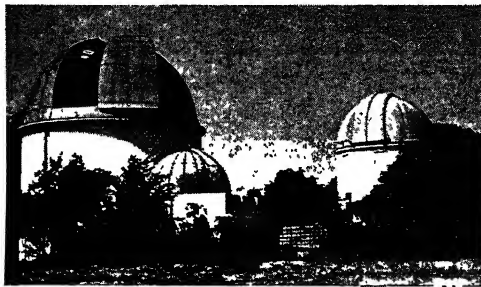
(c) There is a third element in observation of a still higher order, namely, conceptual. The mind sees what it brings with it, the power of seeing. Those who have thought over things, who have, as we say, ideas about them, who have what we may call preconceptions, are likely to see more than the thoughtless and the ignorant—provided always that they keep an open mind as well as an open eye, and do not allow prejudice or desire to influence their vision. The botanist who knows the flora of a countryside is likely to see much more than the casual observer; his store of concepts exerts an influence on his perceptual faculty.

In the mind of the scientific observer, even when precision becomes habitual, there is always caution; he is more aware than others of the possibilities of error; he has learned how easy it is to see what one wishes to see. He has ever before him the test of scientific knowledge, that it must be verifiable by competent observers in similar circumstances.

Observation Post. Military term denoting a position from which it is possible to direct, and to

observe the effect of, artillery fire. In modern warfare the guns frequently fire from positions from which the target is invisible. An observation post from which the target can be seen must then be established well in front of the gun line. The artillery commander is usually the observing officer and passes back his orders to the gun position officer by means of radio or telephone. With very long-range artillery, the observation post may be in an aircraft flying near the target. Artillery is directed in this way only when the target is fixed or slow moving; an observation post is seldom necessary for anti-tank artillery, for this type of weapon is usually sited and fired individually. In anti-aircraft artillery, the predictor, an automatic ranging device, performs the functions of an observation post. (*See Artillery.*) The term observation post is also applied to the sighting positions manned by the Royal Observer Corps.

Observatory. Building constructed and used for the purpose of making astronomical, meteorological, or other kindred scientific



Observatory. The University of London observatory at Mill Hill, Middlesex

observations. Astronomical observatories were founded in China very early, and one was built at Alexandria about 200 B.C.

The most important parts of an astronomical observatory are the cupolas or domes which house the telescopes. Sliding shutters are so arranged that the telescopes can be pointed from the horizon to the zenith, while by the rotation of the whole dome on rollers it is possible to observe any point in the heavens. Where the telescopes are of great size the floors of the domes are made to rise by hydraulic power, to enable the observer to accommodate himself to the changing height of the instrument. A separate building contains the transit instrument, which, together with a sidereal clock, forms an

indispensable part of the equipment of an observatory. The transit instrument is mounted to point N. and S., so that it can move only up and down, and it is used for observing the time a star crosses the meridian of the instrument. This observation gives the means of checking the sidereal clock, since the time the star should be on the meridian is known from other considerations.

The Royal Observatory was founded at Greenwich in 1675 and transferred to Herstmonceux Castle, Sussex, in 1948. At Edinburgh and Cape Town also there are royal observatories. Other national observatories are in Paris, Pulkovo (near Leningrad), Madrid, Tokyo, and Washington. They provide a time service and the observations for a nautical almanac for their respective countries, and engage in long-term astronomical research—Oxford, Cambridge, and other universities have observatories for post-graduate work. Another type is exemplified by the institutions at Lick, Mount Wilson, and Mount Palomar, Calif., the Lowell observatory, Ariz., and the David

Dunlap observatory at Toronto. Large telescopes are maintained in the S. hemisphere at Arequipa, Peru; Bloemfontein and Pretoria, S. Africa; and Canberra, Australia. These were set up because parts of the sky are not visible from older observatories in the N. (*See Astronomy.*)

Meteorology; Telescope.

A. Hunter, F.R.S., F.R.A.S.

Observer. Term formerly used in the R.A.F. to designate any member of an air crew other than the pilot or gunner. Observers were trained at the air observers' school in map reading, the use of navigational instruments, bombing, artillery direction, and reconnaissance. During the Second Great War the increasing complication of duties led to the trade being abolished, and the observer's functions were divided between two men designated navigator and signaller. The navigator's badge



Observer. Badge worn on left breast

consists of a half wing attached to a laurel circle enclosing the letter N; the signaller's badge is similar except that the letter is S. Either is worn on the left breast.

Observer, THE. Oldest Sunday newspaper in London. It was founded in 1794 by William Clement and was controlled by the Clement family until 1870, when it was purchased by Julius Beer, whose wife owned The Sunday Times (*q.v.*). In 1905 The Observer was purchased by Northcliffe, who appointed J. L. Garvin (*q.v.*) editor. In 1907 it passed to Viscount Astor, who retained Garvin. Under the latter The Observer made rapid progress, his political articles achieving great popularity. Garvin retired in 1942. The paper is now owned by a trust, its directors including Viscount Astor. Later editors were Ivor Brown (1942-48) and David Astor. Its dramatic, literary, and music criticism is distinguished, and by 1948 had helped the paper to reach a circulation of 350,000.

Observer Corps, ROYAL. Civilian corps formed in 1925 to track and report movements of enemy aircraft flying over Great Britain. The corps is not part of the R.A.F., but during war it comes under R.A.F. control and forms part of the A.A. defence. Personnel are recruited on a part-time basis from the district in which their posts are situated. On mobilisation a certain number of observers are employed on a full-time paid basis, and the part-time members perform 24 hours' duty weekly. Observers are trained in recognition, plotting, and height-finding. The commandant is responsible to the c.-in.-c., Fighter Command, for operational work, and to the Air ministry for administration and equipment. Officers wear a uniform of R.A.F. blue with black braid on the cuff and distinctive cap-badge; other ranks wear blue battle dress with the corps badge on the left breast.

The corps took up its duties 10 days before the outbreak of the Second Great War, and quickly proved a vital factor in Great Britain's A.A. defence. For outstanding work in the battle of Britain it was given the designation Royal. It guided back to their base R.A.F. bombers crippled in operations over enemy territory, and played a vital part in the defeat of the flying bomb.

Many women were enrolled in the corps, which eventually exceeded 50,000. After the end

of the war in Europe the corps was disbanded, but on Jan. 1, 1947, it was re-formed on a peace-time basis; a nucleus of permanent officers was established and 28,500 spare-time volunteers were enrolled. See Air Defence.

Obsession (Lat. *sedeo*, sit). A fixed idea. Such notions haunt the mind and are often thought to be either panaceas or sources of every kind of evil; e.g. alcohol in the minds of some total abstainers. Serious obsessions are compulsive in that they persist even when the patient realizes that they are abnormal and does his best to drive them from his mind. Obsessions may be regarded as disguised symbols for repressed memories to which a great deal of guilt is attached. As the guilt is felt to be unbearable it is kept out of consciousness altogether, or is eased by being changed into anxiety, while the disguised form of the forgotten behaviour must be one which does not arouse the idea of guilt in the conscious mind. See Neurosis.

Obsidian. Name given to an acid lava akin to rhyolite. The rock is glassy from rapid cooling and is extremely hard and brittle. Usually black or dark grey, it may be occasionally brown or green. It is found in many volcanic regions, and because of its hardness and ability to take a high polish, it was used by primitive man for making his arrow and spear heads, also for knives, ornaments, and mirrors.

Obstetrics (Lat. *obstetrix*, midwife). Art of helping women in pregnancy and childbirth. In the human species the duration of normal labour with a first child is usually from 20 to 24 hours, but after the first delivery the process is easier, and does not usually last more than about 12 hours.

As soon as the child is born, its eyes should be wiped clean with a little cotton wool soaked in a silver or penicillin solution to combat infection possibly acquired in the vagina. The cord which still connects the child with the placenta should be ligatured and divided after pulsation has ceased. The child usually breathes or cries freely; if not, steps should be taken to promote respiration by holding at the heels and slapping. The period following the birth of the child is known as the puerperium, during which the mother's diet should be light and nourishing. She should remain in bed several days. The child should be put to the breast within 12 hours after delivery.

O'Casey, SEAN (b. 1884). An Irish dramatist. Shaun O'Cathasaigh was born of working-



Sean O'Casey,
Irish dramatist

class parents in Dublin, March 31, 1884, and at 14 worked as a builder's labourer, later on the railway. The first play he wrote was *The Shadow of a Gunman*, 1922 (produced at the Court Theatre, London, 1927); most famous were *Junio* and the *Paycock* (Royalty Theatre, 1925, and Hawthornden prize, 1926), and *The Plough* and the *Stars*, 1926. These masterpieces gave vivid pictures of Dublin life during "the troubles." In *The Silver Tassie*, 1929, and *Within the Gates*, 1933, he turned to expressionism, but with *Red Roses for Me*, 1942, he was back in the Dublin slums. *Oak Leaves and Lavender*, 1946, was placed in S. England during the battle of Britain. Autobiographical volumes include *I Knock at the Door* 1939; *Pictures in the Hallway*, 1942; *Drums under the Window*, 1945; *Inishfallen Fare Thee Well*, 1949.

Occasional Conformity. Practice by which many nonconformists avoided the penalties and disabilities of the Test and Corporation Acts. These two Acts forbade anyone to hold any public office unless he took the sacrament according to C. of E. rites. Many nonconformist office holders did this now and again. Attempts in Anne's reign to stop this practice were successful when in 1711 the Occasional Conformity Act made it illegal. In 1718 the Act was repealed and the practice renewed. From 1727 to 1829 it was made unnecessary by an annual Act of Indemnity. See Toleration.

Occasionalism. System of philosophy founded by Arnold Geulinx (1624-69), professor of philosophy at the universities of Louvain and Leyden successively. It denies any reciprocal action of body and soul, comparing them to two watches, which, although separate and independent, are in agreement. God is the intermediary. On the occasion of a bodily process, a definite association arises in the soul, and on the occasion of an idea in the soul, the body moves—as the result of divine agency.

Occiput. Back of the human head, the occipital bone forming

the greater part of it. The lower part of the bone carries two knuckles or condyles, which are jointed to the highest vertebra of the neck. Nodding movements of the head are carried out at these joints.

Occeleve, THOMAS (1368–c. 1450). English poet. A clerk in the privy seal office, he is chiefly remembered for his *Male Regle* and *De Regimine Principum*, two long moral poems of greater historical than literary value. Occeleve continually pays tribute to Chaucer and Gower, to whom he is considered far inferior.

Occultation. In astronomy, the eclipse of a star or planet by the moon or another planet. Occultation observations are now chiefly used for determining the moon's exact position. *See* Eclipse.

Occultism (Lat. *occultas*, hidden). Term applied to any theories, doctrines, arts, or practices dealing with alleged phenomena not explained by physical science, but attributed to supernatural or non-natural causes. *See* Magic; Necromancy; Spiritualism; Theosophy; Witchcraft.

Occupancy. A term used in English law. It means taking possession of something, whether land or chattels, which belonged to nobody. It was recognized as a legal title to land only in the case of tenancies *pur autre vie* (old Fr., for the life of another). When an estate was granted to A for the life of B, and A died before B, anybody who could first go in and occupy the land might keep it for the rest of the life of B. But by the Wills Act, 1833, this has been altered. A can now devise the estate by his will; or, if he does not so deal with it, it passes with the rest of his property to his executor or administrator.

Occupational Diseases. Diseases that occur more frequently among those in certain occupations than among the general population. Officially termed industrial diseases, they include (a) dust disease of the lung (pneumokoniosis), which may be anthracosis from coal-dust (miners' phthisis); siderosis from fine metallic particles in mines; asbestosis associated with the manufacture of asbestos goods; silicosis from quartz, sand, slate, etc.; (b) poisoning caused by breathing in vapour (mercury, lead, aniline, benzene); (c) anthrax, a microbic disease associated with sorting wool, hair, hides, skins, etc.; (d) poisoning caused by the absorption through the skin of lead or aniline; (e) dermatitis, inflam-

mation of the skin through many irritants; (f) chronic ulceration of the skin; (g) skin cancer, associated principally with contact with pitch, tar, bitumen, paraffin, etc.; (h) physical defects and abnormalities, e.g. nystagmus (miners' blindness), housemaids' knee.

Measures taken against industrial diseases include regulations for air purification, water spraying to lay dust, and protective clothing; factory inspection; the work of the industrial health research board; and publicity. The Factory Act, 1937, and the Lead Paint (Protection against Poisoning) Act, 1926, empower the minister of Labour to make regulations for the protection of employees, and require employers to report cases of lead poisoning, anthrax, skin cancer, and chrome ulceration. The incidence of the first has been much reduced, but skin cancer and dermatitis have increased, principally because of unsuspected dangers associated with new processes and substances.

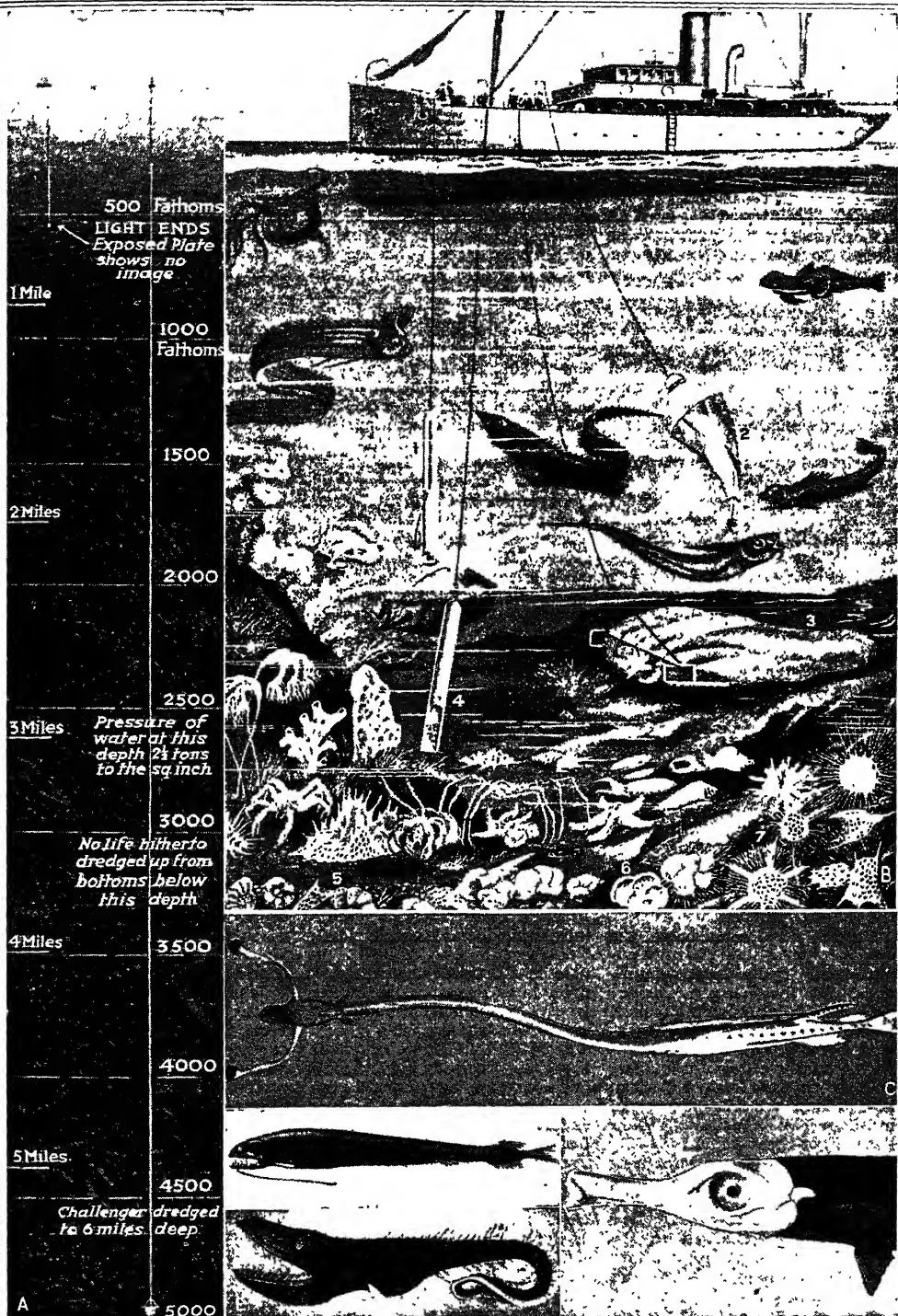
Ocean (Gr. *okeanos*, stream encircling earth's disk). Name applied to the great sheet of seawater which covers about 70 p.c. of the surface of the earth. The descriptive science of the ocean is termed oceanography, which includes research on the ocean boundaries and the form of the sea floor, the physics and chemistry of seawater, the types of ocean currents, and the many aspects of marine biology and marine sedimentation. The foundations of oceanography were laid by the worldwide investigations of the Challenger Expedition (*q.v.*), 1872–76. Since 1920 knowledge of the shape of the sea floor has been greatly increased by the introduction of echo sounding, which reveals more clearly than the laborious method of sounding with line and lead the uneven nature of the sea bottom. A series of soundings taken from the shore line out to sea shows that the sea floor slopes gently downwards out to distances of 10 to 150 m. At the seaward limit of this slope, termed the continental shelf, the depth may average from 50 to 100 fathoms. From the edge of the continental shelf the sea bottom drops more rapidly to the floor of the oceans, with gradients reaching as much as 1 in 10 and averaging 1 in 15. This region actually represents the flank of the continent and is known as the continental slope. The floor of the oceans is much less regular and is characterised by two large-scale features: the presence of great

circular or oval depressions called ocean basins, and of elongate elevations or ridges generally with steep sides. The larger ridges tend to run parallel to the continental coasts, thus dividing the oceans into elongate troughs. This ridge and basin structure is a striking feature of the bottom of the Atlantic and Indian oceans and of the W. part of the Pacific ocean.

The temp. of seawater is measured in degrees centigrade and ranges in the open ocean from -2° C. to 30° C. The oceans derive a great part of their heat from the absorption of radiation from the sun and sky; they lose heat by back radiation from the surface, by convection of heat to the atmosphere, and by surface evaporation. The oceans are great reservoirs of heat and in conveying it to the atmosphere exercise a moderating influence on climate. Surface temps. are naturally highest in the equatorial regions and coldest at the poles. In the depths of the oceans the temps. are uniformly low and range from -1° C to 4° C. The dissolved salts in seawater are principally chlorides and sulphates of sodium, magnesium, potassium, and calcium, the salt content or salinity being expressed as the number of grams of salt contained in one kg. of seawater, for which the symbol ‰ is used. In the open ocean the surface salinity is generally between 33‰ and 37‰ . The surface salinity is chiefly determined by three processes; evaporation from the sea increases it, precipitation decreases it, processes of mixing continually change it.

Ocean currents are of three types: (1) those that are related to the differences of density in the sea; (2) those set in motion by wind; (3) tidal currents and currents associated with internal waves. The great ocean currents such as the Gulf Stream and the equatorial currents belong to the first type. Winds can drive water in a definite direction if they blow prevailingly from one quarter, but the oscillating currents generated by the tides are of little direct importance in the oceanic circulation. The velocity and direction of currents can be measured either directly, e.g. by current meters, or indirectly by observations on the distribution of salinity or density. *See* Fish; Marine Biological Research; Marine Sedimentation; Plankton.

Ocean Falls, Town of British Columbia, Canada. 350 m. N.W. of Vancouver, to which it is con-



A. Diagram illustrating results of deep-sea research. B. Some methods used in exploring the depths of the North Atlantic. 1. Instrument for obtaining samples of water for analysis. 2. Hensen's deep-sea net. 3. Trawl. 4. Instrument for taking soundings, temperature, and samples of ocean bed. 5. Globigerina ooze with

6. globigerina and, 7. radiolarians, all highly magnified. C. Fish with luminous head organs found at a depth of from 1,000 to 2,000 fathoms. D. Fish with highly sensitive organs of touch. E. Fish with distending stomach, capable of holding prey larger than itself. F. Fish with entirely phosphorescent head

OCEAN: METHODS AND RESULTS OF SCIENTIFIC EXPLORATION

nected by steamship services. It has important pulp and paper works. Pop. 2,700.

Oceania. Collective name for the groups of islands in the South Seas, or South and Central Pacific Ocean.

Physically, Oceania includes five groups of islands: (1) the Australasian Festoon stretches from New Guinea to Macquarie Island, and includes the Papuan Islands, New Caledonia, and New Guinea; the natural features of this group are cognate with those of Australia; the Loyalty Islands are coralline, the Solomons volcanic. (2) The Micronesian Festoon extends from the Caroline Islands to the Friendly Islands and includes Fiji and Samoa; the islands rest on the outskirts of a submarine platform connected with Australia. (3) The Pelew-Ladrone Festoon includes the Volcano Islands and forms a link along the E. of the China Sea between Japan and the East Indies; it belongs to Asia. (4) The Central Pacific Chain rests on an isolated submarine platform, and includes Hawaii and the Ocean Islands. (5) The S. Pacific Chain includes Easter Island on the E., the Society, Cook, and Phoenix Islands, and Fanning Island.

The islands of Oceania are also loosely grouped in relation to their inhabitants into Melanesia, Micronesia, and Polynesia (*q.v.*); this grouping ignores New Guinea, New Zealand, and New Caledonia, as well as the relation of the islands to the relief of the floor of the Pacific. Politically, Oceania is divided among Great Britain, France, the U.S.A., and Chile.

British Oceania includes the crown colony of Fiji, islands administered by the high commissioner for the Western Pacific; Cook and other islands annexed to New Zealand, including Auckland and Chatham Islands; Norfolk Island, which is Australian; as well as the former German islands now administered under mandate by Australia, New Zealand, or Great Britain.

French Oceania comprises New Caledonia and its dependencies, Tahiti, and the rest of the Society Islands, The Marquesas, Low Archipelago, the Leeward Islands, and the Gambier group. The New Hebrides are jointly British and French. Hawaii is the chief U.S. group in Oceania; Guam, Tutuila, and other Samoan islets also are American. Easter Island belongs to Chile. Between the Great Wars Japan administered the former German islands north of the

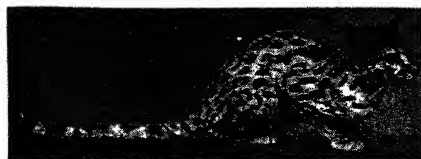
equator, the Pelews, Ladrone, Carolines, and Marshalls.

Ocean Island. Island in the Pacific Ocean. Situated just S. of the equator, $0^{\circ} 52' S.$, $169^{\circ} 35' E.$, it is 6 m. in circumference. First occupied by Great Britain in 1901, it was annexed to the Gilbert and Ellice Islands colony in 1916 and became headquarters of the administration of the W. Pacific. The island is rich in high-grade phosphates; the right to work them was purchased by the British phosphates commissioners in 1921. Normally the island has a pop. of some 2,500. In the Second Great War it was occupied by the Japanese, who deported the population, but surrendered to an Australian landing party in Oct., 1945.

Oceanography. This subject is fully treated under Ocean (*q.v.*).

Oceanus. In Greek mythology, the god of the ocean, the father of all things. The name was also given to the river supposed to encircle the whole earth, which was regarded as being flat. At a later date, the term Oceanus was applied generally to the greater seas outside the Mediterranean.

Ocelot (*Felis pardalis*). Species



Ocelot. Specimen of the South American tiger-cat
W. S. Derridge, F.Z.S.

of wild cat occurring in tropical America. It has tawny fur, beautifully marked, and is usually nearly 3 ft. long. It spends much of its time in the trees, where it preys upon birds and small mammals. In captivity it is morose and savage. Pron. O-selo.

Ochil Hills. Range of hills in Scotland, principally in Perthshire, but also occupying parts of the cos. of Stirling, Clackmannan, Kinross, and Fife. They trend 25 m. N.E. from Bridge of Allan to the Firth of Tay, and enclose many valleys and glens of great beauty. The principal summits are Ben Cleuch (2,363 ft.) and King's Seat (2,111 ft.). Coal and other minerals abound.

Ochre. Iron ore consisting essentially of iron oxide more or less hydrated and mixed with clay. The colour varies from yellow to red according to the degree of oxidation—ferrous oxide (FeO) yellow, ferric oxide (Fe_2O_3) red. The strength and purity of colour depend upon the proportion and

quality of the non-ferrous constituents. Deposits of this type occur in many parts of the world, but those of sufficiently pure colour and in quantity great enough for commercial development and use in the paint industry are comparatively few. France, South Africa, and India supply ochres of high quality. See Pigments.

Ochrida, OKHRIDA, OR OHRID. Lake and town of Yugoslavia. The lake lies in the S. of Serbia, high among the mts., on the Albanian frontier: 18 m. long by 8 m. in breadth, it has a depth of almost 1,000 ft., and is drained by the Black Drin. The ancient Via Egnatia connected the N. end of the lake with the Adriatic coast by the Skumbi valley. The town, situated on the N.E. shore of the lake, is the seat of a Greek Orthodox bishop. It is connected by the modern equivalent of the Via Egnatia with Monastir. After the evacuation of Monastir in 1915, the Serbians retreated through Ochrida, which was finally recovered by the Allies in Sept., 1918. Pop. est. 10,000.

Ochs, ADOLPH SIMON (1858–1935). American newspaper proprietor. Born at Cincinnati, March 12, 1858, he spent most of his early days in subsidiary newspaper posts at Knoxville, Tenn. In 1878 he became owner of The Chattanooga Times, in the same state, and in 1896 acquired The New York

Times (*q.v.*), the circulation of which had dropped to 9,000, and which was losing \$1,000 a day. By his skilful management he raised it to the highest position in the daily press of the U.S.A. From 1900 he was a director of the Associated Press. By a gift of \$500,000 he made possible the preparation and publication of the Dictionary of American Biography. He died while on a visit to Chattanooga, April 8, 1935.

Ochterlony, SIR DAVID (1758–1825). British soldier. Born at Boston, U.S.A., Feb. 12, 1758, he



Sir D. Ochterlony,
British soldier
After Davis

entered the service of the E. India Co. in 1777. He won distinction by his defence of Delhi in 1804 and by his successful leadership during the war with the Gurkhas, when the ruler of

Nepal was forced to terms. As resident at Rajputana, his action in 1825 led to a rupture with the governor-general, Lord Amherst, and he resigned. He died almost at once at Meerut, July 15, 1825. He was made a baronet in 1816.

Ockham OR **OCCAM**, **WILLIAM** OF (d. 1349). English Franciscan monk and schoolman, known as the Invincible Doctor. He was born at Ockham, in Surrey, and died at Munich. His defence of Nominalism against Realism gained him the name of Prince of Nominalists. One of his chief merits is that he restored induction to its proper place as the handmaid of deduction.

O'Connell, **DANIEL CHARLES** (c. 1745-1833). Irish soldier. Born in co. Kerry, he entered the French army in 1770. With the Irish brigade he served in the Seven Years' War, in Mauritius, and at the siege of Gibraltar, winning the title of count and the rank of colonel. In 1792 he took the side of the Bourbons, and, having sought refuge in London, he proposed to form an Irish brigade to serve against the republic. The scheme, however, failed. He returned to France after the peace of Amiens in 1802, and died there, July 9, 1833. The Liberator (*v.i.*) was his nephew.

O'Connell, **DANIEL** (1775-1847). Irish leader, known as the Liberator. Born near Cahirciveen, co.

Kerry, Aug. 6, 1775, he was educated at the English Colleges at St. Omer and Douai, studied at Lincoln's Inn 1794-96, and was called to the Irish bar, 1798.



Daniel O'Connell
Irish leader
After T. Garrick

Starting in 1803 on his long struggle for Catholic emancipation, by 1808 he had become the virtual leader of the movement in Ireland. In 1815 he killed in a duel a Dublin tradesman named D'Esterre, and in 1820 a duel with Sir Robert Peel, arranged to take place in Ostend, was prevented by O'Connell's arrest and his being bound over in London.

In 1823 O'Connell founded the Catholic Association (*q.v.*), and in 1826 the Order of Liberator, which was to prevent secret societies, feuds, and riots, protect the rights of franchise holders, and generally unite Irishmen of all classes for the common good.

His election as M.P. for co. Clare, 1828, and his refusal to take

the oath, had their influence in the passage of the Catholic Relief Bill, 1829, and, re-elected unopposed, he took his seat in Feb., 1830. Before long he started his struggle for the repeal of the legislative union, and came to a working arrangement with the Whigs in 1835. The Repeal Association was founded in 1840, the powerful Nation newspaper in 1842, and in 1843 came monster meetings all over Ireland. A great gathering fixed for Clontarf was proclaimed, and O'Connell was arrested and tried for sedition. He was fined £2,000, and sentenced to one year's imprisonment, but the sentence was reversed by the house of lords, 1844. He supported Lord John Russell's ministry, 1846; but ill-health and increasing party dissensions in Ireland clouded his genius. He died at Genoa, May 15, 1847. See Catholic Emancipation; Ireland: History. Consult Lives, R. Dunlop, 1900; D. Gwynn, 1929.

O'Connor, **FEARGUS EDWARD** (1794-1855). Irish agitator and Chartist. The son of Roger O'Connor, one of the United Irishmen, he was born July 18, 1794, educated at Trinity College, Dublin, and entered parliament in 1832 as M.P. for co. Cork. In 1835



Feargus O'Connor
Irish agitator

he was unseated on petition, and transferred his activities to England, where he became leader of the Chartist movement, advocating extreme measures in his speeches, and in a paper, The Northern Star, which he established at Leeds. In 1846 he was imprisoned for seditious libel. In 1847 he was elected M.P. for Nottingham, and in 1848 he presided over the great Chartist demonstration at Kennington. Found to be insane in 1852, he died in London, Aug. 30, 1855. See Chartism.

O'Connor, **THOMAS POWER** (1848-1929). Irish journalist and politician. Born at Athlone, Oct. 5, 1848, he was educated there and at Queen's College, Galway, and became a journalist in Dublin in 1867. In 1870 he joined the Daily Telegraph. He founded and was first editor of the Star, the Sun, the Weekly Sun, M.A.P., and T.P.'s Weekly (later revived as T.P.'s and Cassell's Weekly). A fluent and picturesque writer, he was the author of a brilliant life of Lord Beaconsfield and studies of

the Parnell movement, and Gladstone's house of commons. In 1880 "Tay Pay" was returned as



Nationalist M.P. for Galway. Elected in the same interest in 1885 for both Galway and the Scotland division of Liverpool, he chose the latter constituency, and represented

it until his death. He earned great popularity in the house of commons, of which he became the Father, and in 1924 was made a privy councillor. He was president of the United Irish League of Great Britain from 1896, and in 1917 became chairman of the British board of film censors. He died Nov. 18, 1929. His Memoirs of an Old Parliamentarian appeared in 1929. Consult Life, Hamilton Fyfe, 1934.

Ocotlan. The principal port of the lake of Chapala, Mexico, a body of water 70 m. by 20 m. Constant trainloads of cereals, fruit, and vegetables travel to Mexico City and even to the U.S.A. from this busy port. Pop. 15,000.

Octane Number. A means of rating spark-ignition engine fuels in terms of their ignition quality. When the compression ratio of such an engine is increased, all other factors being constant, the power output will also increase until detonation (knock) commences, when it will decline. Normal paraffin hydrocarbons are poor in this respect, aromatic hydrocarbons good, and certain isoparaffins and alcohols excellent. A poor fuel can be improved by adding very small quantities of substances such as tetra-ethyl lead. To rate fuels in order of their ability to resist detonation the characteristics of the fuel under test are compared with those of mixtures of normal heptane (a very poor fuel) and iso-octane (2:2:4-trimethylpentane, a high-grade fuel). The percentage of iso-octane in the mixture which has the same characteristics as the fuel under test is said to be the octane number of that fuel. On this basis the highest number should be 100 and no fuel should be rated above iso-octane, but such fuels are known. These are compared with mixtures of *n*-heptane + 4 ml. tetra-ethyl lead and iso-octane + 4 ml. tetra-ethyl lead, when a maximum rating of 120 can be reached.

Although the octane number is supposed to be a measure of the knock characteristics of a fuel, other factors sometimes enter, e.g. engine design and adjustment, load, and atmospheric conditions. Persistent detonation in aero engines, because of much more severe operating conditions, cannot be tolerated, and therefore for rating aviation spirits the details of the testing method are altered so as to take those special factors into account.

Octans. Constellation which surrounds the Southern Pole. It is of considerable extent, but its stars are faint. The Southern Pole star, Sigma Octantis, is between fifth and sixth magnitude. *See* Constellation.

Octave (Lat. *octavus*, eighth). Word used in several senses. (1) In music, an interval of 8 scale steps, and the second note of the harmonic series. It is a perfect consonance, and the upper note of an octave bears the same alphabetical name as the lower note. An organ stop of 4-ft. pitch on the manuals and of 8-ft. pitch on the pedals is called an octave. (*See* Organ). (2) In literature, the first two quatrains of the sonnet, written on the same pair of rhymes, are termed the octave, and the word is applied less technically to any stanza of eight lines. (3) In ecclesiastical terminology, an octave is the eighth day after a festival, the feast day itself being reckoned as the first.

Octave Flute. Small flute sounding an octave higher than the ordinary flute. *See* Piccolo.

Octavia (d. 11 B.C.). Sister of Octavian, afterwards the Roman emperor Augustus, and wife, first of G. Marcellus, by whom she was the mother of Marcus Marcellus (q.v.), and secondly of Antony, the triumvir. The desertion of Octavia by Antony for Cleopatra was an important factor in causing the war between Octavian and Antony.

Octavo (Lat. *octo*, eight). Term used in connexion with the size of books. An octavo or 8vo volume is one in which the sheets have been cut into eight. The size of a page is usually about 5 ins. by 9½ ins., but royal octavo is somewhat larger. *See* Book.

Octet (Lat. *octo*, eight). Musical composition for eight performers. The term is sometimes applied to a double quartet, but belongs properly to a work in which the eight instruments are treated independently. Schubert wrote a famous one for clarinet, horn, and bassoon, with two violins, viola,

violinello, and double bass. Gade, Svendsen, and Mendelssohn wrote octets for strings alone, and Beethoven left one, called Grand Octuor (Op. 103), for two oboes, two clarinets, two horns, and two bassoons. An orchestra of eight performers is also called an octet.

October (Lat. *octo*, eight). Eighth month of the old Roman and tenth of the Christian calendar. For short periods it was given different names in honour of Roman emperors, e.g. Domitianus, in honour of Domitian; and Invictus (unconquered), in allusion to the athletic prowess of Commodus. It was also called temporarily Faustinus, in honour of Faustina, wife of the emperor Antoninus Pius. The Anglo-Saxons called it Winter-fylleth (winter full moon), from the supposed beginning of winter with the October full moon. *See* Calendar.

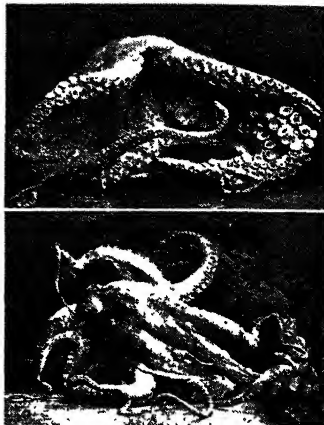
October Revolution. Name given to the Petrograd revolution which was the first stage in the Bolshevik rising in Russia. By western calculations the outbreak occurred on Nov. 7, 1917, but in Russia the Greek Orthodox calendar was in force, which is 13 days behind the rest of Europe; Russians therefore regard Oct. 25, 1917, as the date of the Revolution, and accordingly speak of the October Revolution to distinguish it from that of March, 1917.

Octodon. Generic name of a rodent mammal known as the degu. In form it is like a common rat, is about 8 ins. in length, and has yellowish-brown fur, mottled with black, on the upper parts, and yellowish below. It occurs in Chile and Peru. The family Octodontidae includes about 27 genera.

Octopus (Gr. and Lat. *octo*, eight; *pous*, foot). Genus of cephalopodous (head-footed) molluscs. There are numerous species, the common octopus (*O. vulgaris*) occurring round the S. British coasts. It has a rounded bag-like body, with a large head bearing eight long "arms" or tentacles thickly studded with suckers. It is greyish brown in colour, with numerous tubercles on the skin, and it can alter its hue considerably to suit its surroundings. When irritated, it becomes dark, and large tubercles rise on the skin. The mouth is provided with a horny beak resembling a parrot's. The round eyes are prominent and staring.

The octopus lurks in holes in the rocks and crawls on the sea bottom in search of the crustaceans and bivalves on which it chiefly feeds; but it can swim backwards by forcibly

expelling water from its siphon. The female produces about 50,000 eggs in the season. These resemble grains of rice, and are attached in stalked clusters to rocks and stones.



Octopus vulgaris creeping forward; top, turned on its side, showing tentacles studded with suckers

On the Mediterranean shores and in the Channel Islands the octopus is dried and used for food. *See* Animal colour plate; Cephalopoda.

Octroi (Fr. *octroyer*, to grant). French name for a local tax, one in the nature of an import duty. Roman in origin, the custom took root in France, but its modern use dates from the 12th century. Many cities and towns obtained from the king the right to levy octroi duties and retained it until the Revolution. They were paid on goods sold in their markets or entering their town. A percentage of the duties was usually paid to the national treasury, and they were let out to farmers. The octroi was abolished in 1791, but restored in 1798 to Paris, and later to other cities, under conditions which have been several times revised. It was abolished in Belgium in 1860, and in Great Britain never found favour, though the coal and wine dues which were levied at one time on goods entering the port of London were a kind of octroi. *See* Customs; Taxation.

Odde. Village and tourist resort of Norway. It stands at the S. end of the Sor fjord, an arm of the Hardanger fjord, and is the terminus of the routes from Telemarken and Stavanger fjord.

Odd Fellows, ORDERS OF. Fraternal, benevolent, and sickness insurance friendly societies. Founded early in the 18th century, when mentioned by Defoe, the earliest known lodge was existing in London in 1745. Members

were assisted in sickness or poverty from lodge funds. In the latter half of the century the order was proscribed as seditious, but in 1813 a great revival took place at Manchester, where the Independent Order of Odd Fellows, Manchester Unity Friendly Society, the largest order, was founded. This speedily absorbed most of the minor lodges in Great Britain, and in 1819 spread to the U.S.A. Daughter organizations exist in most civilised countries. See Friendly Societies.

Ode (Gr., chant). In its literal sense, any poem written to be sung to musical accompaniment. The Greek ode developed along two wholly different lines. As the subjective expression of personal emotion it was moulded by Alcaeus, Anacreon, and Sappho into the lyrical stanzas still known by their names, adapted with exquisite perfection to the genius of the Latin language by Catullus and Horace, and reproduced in an infinite variety of graceful shapes by lyricists of every cultured race. As the ritual hymn solemnly chanted by the chorus at festivals primarily religious in intention, the ode was developed by Stesichorus, Simonides, and Bacchylides, and brought to its finest perfection of structure and fiery splendour by Pindar (*q.v.*).

It is to the stately choric composition that the word ode is now more generally applied. But while many poets, impressed by the majesty and the concurrent exuberance of the Pindaric ode, have sought to capture its spirit and acclimatise it in their own country, few have had the perception and the learning necessary to analyse its composition and master the intricate detail of its technical structure. The earliest Stesichorean ode, with its division into strophe, antistrophe, and epode, has been reproduced with considerable success by several poets, Congreve, Gray, and Matthew Arnold among them. The true Pindaric ode still remains a thing apart, unmatched. Meanwhile, though his odes were not Pindaric at all, Cowley in his so-called Pindaric Odes created a literary form, now generally called the irregular ode,

very suitable to the English genius, and put to triumphant use by Milton, Dryden, Wordsworth, Tennyson, and by Francis Thompson in *The Hound of Heaven*.

Odenathus. Prince of Palmyra, and husband of Zenobia. After the defeat of the army of the Roman emperor Valerian by the Persians, he organized a successful resistance, and in a series of campaigns from 262 to 264 restored Mesopotamia to Rome, and carried his arms as far as Ctesiphon. For these services he was rewarded by Valerian's successor Gallienus with the title of Imperator, but was shortly after assassinated. His widow, Zenobia, then reigned as queen.

Ödenburg. Alternative name for the Hungarian town more usually called Sopron (*q.v.*).

Odense (*Odins-ø*, i.e. Odin's Island). City of Denmark, capital of Fünen, and third largest city in the kingdom. Situated near the mouth of the river Odense, and connected with Odense Fjord by a ship canal, it has a good harbour, a castle, museum, technical schools,

ft. in alt. and has an observation tower. Odenwald is a populous region and there are castles and hamlets in the valleys. The Bergstrasse on the W. Odenwald is rich in legend and is mentioned in the *Nibelungenlied* (*q.v.*).

Oder. A river of Eastern Europe. It rises near Kozlau in Moravia, Czecho-Slovakia, and flows through Silesia and Pomerania to the Baltic Sea at the Stettiner Haff. In Silesia it occupies a valley between the Bohemian and Polish plateaux. It has been canalised to a depth of at least 5 ft. for 480 m. from the mouth of Swinemünde to Ratibor, although boats of 400 tons stop at Kosel, the river port for the mining region of Upper Silesia. The chief tributary is the Warta (Warthe), which with its affluent the Netze drains the W. plains of Poland. Canals connect with the Elbe and Vistula. Length, 550 m.

When in the last stages of the Second Great War the Russians pressed beyond the Vistula, the Oder formed the last natural obstacle before Berlin, and by Jan. 24, 1945, Koniev's troops had reached the upper Oder and captured Oppeln. He then surrounded and cut off Breslau (Wrocław) and Glogau on the opposite bank and deployed his troops on the Neisse. Farther north, Zhukov reached Küstrin (Kistrzin), 60 m. from Berlin, by Feb. 7, and set about extending his line to the N. Küstrin fell March 12, Altdamm, on the Oder estuary, March 20, and by the end of March the E. bank of the river was in Russian hands.

In the S., Breslau and Glogau held out, and the Russians paused; but on April 16 they crossed the Oder. Frankfurt-on-Oder was captured April 23, the same day as the Russians entered Berlin. (See Russo-German Campaigns.)

At the Potsdam Conference (*q.v.*) it was agreed that Poland should occupy E. Germany up to the Oder and Neisse rivers pending the settlement of her claims against Germany in the peace treaty.

Odessa. City and seaport of Ukraine S.S.R., the chief business centre. It is situated 25 m. N. of the mouth of the Dniester, 90 m. S.W. of Kherson, and is the terminus of the south-western rly. It contained a large cathedral, university, and observatory.



Odense, Denmark. House where Hans Christian Andersen was born

seminary, and a park. The cathedral of S. Knud, founded 1086, is one of the finest Gothic edifices in Denmark; the church of Our Lady dates from the 12th century. It is a fine town, with a modern town hall. Cloth, gloves, chemicals, and tobacco are manufactured, and grain, eggs, butter, bacon and other dairy produce, and hides exported. Odense was the meeting-place of several diets and councils, and the birthplace of Hans Andersen, whose house has been converted into a museum. Pop. 92,436. See Andersen, H. C.

Odenwald. Wooded mt. region in the *Land of Hesse*, W. Germany. It lies between the Neckar and the Main. Composed of basalt, gneiss, granite, and syenite, the mts. have many valleys and ravines. The highest peak, the Katzenbuckel, is 2,057



Odessa arms



Odessa, Ukraine. The broad stairs which descend from the main boulevard to the harbour

Odessa (the Roman *Istrianorum portus*) was founded by Catherine II in 1795 on the shores of the Black Sea, in order to provide the country with one ice-free winter port. Cut off from communication with the Allies when Turkey closed the Dardanelles, in 1914, Odessa was bombarded by the Turkish fleet on several occasions. It was occupied from the land side by the Germans on March 12, 1918, and was taken by the Bolsheviks in 1920. The Soviet government made it an open port.

Heavily bombed by German aircraft in June, 1941, Odessa was encircled by a German-Rumanian army by Aug. 23. The defenders held out until Oct. 16, when the city was evacuated after all buildings and industrial plants had been destroyed. On April 10, 1944, the 3rd Ukrainian army captured the city from the Germans and Rumanians, the Russian Black Sea fleet and air force preventing any large scale evacuation by sea. Pop. (pre-war), 604,223. *See* Ukraine.

Odets, CLIFFORD (b. 1906). American dramatist. Born at Philadelphia, July 18, 1906, and educated in New York, he became an actor in repertory during 1923-28, also playing in Theatre Guild productions. His first play, *Waiting for Lefty*, established his reputation as a playwright, and he achieved popular success with *Awake and Sing*, 1935 (produced at the Arts Theatre, London, in 1942). Other plays included *Paradise Lost*, 1936; *Golden Boy*, 1937; *Clash by Night*, 1942; and *Rocket to the Moon* (produced at S. Martin's Theatre, London, in 1948).

Odeum. Latin form of the Greek *Odeion*, name for a building devoted to musical performances. Such buildings used to be found in many Greek cities, but the most famous were the odeum of Pericles S.E. of the Acropolis at Athens,

and that built by Herodes Atticus at the foot of the Acropolis in Athens A.D. 160. The Athenian odeum held about 8,000 people, and its ruins still stand.

Odiham. Village of Hants, England. It is 8 m. E. of Basingstoke, and has a Gothic church containing interesting brasses, also some ancient houses. The ruins of Odiham Castle, 1 m. N.W., date from the 14th century.

Odin. In Norse mythology, the greatest of the gods. He is the Anglo-Saxon Woden and German Wotan, and his name, cognate with Lat. *vates*, a seer, probably means 'frenzied'. Creator of the world and of mankind, he is called All-father. Contrasted with the rough peasants' god Thor, he was worshipped specially by the noble families, many of whom claimed descent from him, and was a patron of culture, inventor of runes, and god of wisdom, poetry, magic, and prophecy. In various forms, but chiefly as a one-eyed old man wrapped in a mantle, he wandered through the earth. As a war god Odin was lord of the Valkyries, and those who fell in battle, regarded as sacrificed to him, were received by him into Valhalla. *See* Mimir; Valkyrie; Wednesday; Mythology; Ymir.

Odo (c. 1036-97). A Norman prelate. A half-brother of William the Conqueror, who made him bishop of Bayeux in 1049, he fought at the battle of Hastings and was made earl of Kent in 1067. After William's death he led a rebellion against William Rufus, and escaped to Normandy, dying on the first crusade, at Palermo, in Feb., 1097. *See* Bayeux Tapestry.

Odoacer, ODOVAKAR, OR OTTO-KAR (c. 435-493). German soldier. A prince of one of the tribes on the Danube, he entered the Roman army and became one of the imperial bodyguard. Putting himself at the head of a revolt of German mercenaries, he compelled the emperor Romulus Augustulus to abdicate, was raised to the rank of patrician by Zeno, emperor of the East, and became ruler of the West, nominally as a representative of Zeno, but in reality independent. Zeno, jealous of his success, persuaded Theodoric the Ostrogoth to attack him. Defeated on the Isonthius (Isonzo), 489, and at Verona, 490, Odoacer was be-

sieged in Ravenna for three years. Theodoric at first treated Odoacer well and accepted him as joint ruler, but on the pretext that he was scheming to gain possession of the whole of Italy, treacherously slew him, March 5, 493.

Odometer (Gr. *hodos*, way; *metron*, measure). Instrument to register the number of revolutions of a carriage wheel to which it is attached, and thus the distance travelled by the vehicle. It consists of two wheels of the same diameter placed face to face and turning freely on a common axis. The edge of one wheel is cut into 100 teeth and that of the other into 99 teeth, an endless screw working in the notches of the wheels. When the screw has turned 100 times, the wheel with 99 teeth will have gained one notch on the other, which gain is registered on an index. Modern speedometers incorporate two odometers; one to record mileage run from zero to 99,999 m., the other the mileage of individual journeys.

Odontoglossum. Large genus of orchids of the family Orchidaceae, natives of tropical America. They have pseudo-bulbs and sword-shaped, more or less leathery leaves. The large, showy flowers are in handsome sprays. They are distinguished by the column being long and narrow, and by the base of the lip being parallel with the face of the column. *See* Orchid, colour plate; Orchis.

Odontolite. Fossilised bone or tooth, tinged blue by impregnation with phosphate of iron, or green by copper. It is known as bone turquoise or occidental turquoise, and when cut *en cabochon* resembles the true gem; but it is softer, appears grey by candle-light, and bleaches in alcohol.

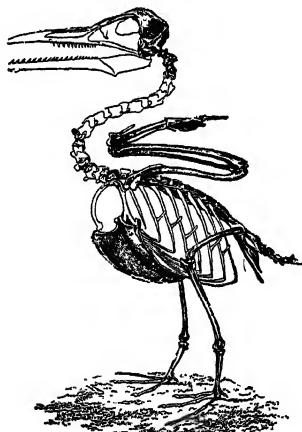
Odontology (Gr. *odous*, tooth; *logos*, science). Science relating to the teeth. *See* Dentistry; Teeth.

Odontornithes (Gr. *odont-*, tooth; *ornith-*, bird) or **ODONTOGNATHAE** (Gr. *odont-*, tooth; *gnathos*, jaw). Name given to a group of fossil toothed birds. Though living birds have no teeth, there are embryonic evidences of their descent from toothed birds. Fossil remains of the latter, which include the orders Hesperornithiformes and Ichthyornithiformes, are found in Cretaceous and Jurassic beds. The teeth of these fossil birds closely resemble those of present-day reptiles. *See* illus. in facing page.

O'Duffy, EORN (1892-1944). Irish politician. Born in Monaghan, Oct. 30, 1892, he joined the

I.R.A. in 1917, becoming chief of staff. When the Irish Free State was created in 1922 he was given the rank of general and appointed head of its forces and chief of the civic guard. Dismissed by Eamon De Valera in 1933, he formed his own force, the national guard, adopting the blue shirt as its uniform. Declared illegal, this body fused with Cumann na nGaedheal to form the Fine Gael party, of which O'Duffy was president. In 1934 the latter withdrew his bluishirts from the coalition to form the National Corporate party. He led an Irish brigade which fought on the side of Gen. Franco in the Spanish Civil War; and published *The Crusade in Spain*, 1938. He died Nov. 30, 1944.

O'Dwyer, Sir Michael Francis (1864-1940). British administrator. Born April 28, 1864, he was educated at S. Stanislaus college, Tullamore, and Balliol College, Oxford, and entered the Indian civil service in 1885. Appointed lieut.-gov. of the Punjab in 1913, he was concerned with Gen. Dyer in the suppression of the Amritsar riots in 1919, and was relieved of his position. It was made clear, in the course of a libel action he brought in 1930 against a member of the Indian government, that O'Dwyer was in no way responsible for Dyer's action in opening fire on the rioters, although he supported the general against critics. He was made K.C.S.I. in 1913. On March 13, 1940, he was shot dead by an Indian at a meeting at the Central Hall, Westminster. He was the author of *India as I Knew It*, 1925.



Odontornithes. Reconstruction of skeleton of *Ichthyornis victor*, one-sixteenth actual size. See facing p.

Odysseus. Greek form of the name of the hero called in Latin Ulixes and later Ulysses. In Greek legend, he was king of Ithaca, one of the leading heroes on the Greek side in the Trojan war, and the type of a resourceful and versatile leader. Many tales were told of the ways in which he distinguished himself by his prowess and wisdom.

His wanderings after the fall of Troy are the theme of the *Odyssey*. Having reached Ithaca, he found that during his absence his wife Penelopë had been plagued by about 100 suitors for her hand, who had quartered themselves in the royal palace. Disguised as a beggar, and making himself known only to his son Telemachus and a trusty swineherd, Odysseus made his way to the palace, and was discovered by an old nurse. Penelopë, apprised of the return of her husband, agreed to give her hand to the suitor who should be able to bend the great bow of Odysseus. He alone succeeded, and then turned its arrows upon the suitors, whom he slew with the help of Athena and Telemachus. Odysseus was unwittingly slain by Telegonus, his son by Circe.

Odyssey. Greek epic poem attributed to Homer. It is in 24 books dealing with the 10 years' wanderings of Odysseus on his way home after the fall of Troy. After relating Odysseus's many surprising adventures, such as those with the lotus-eaters, the Cyclops, the enchantress Circe, the shades of the dead, the Sirens, the nymph Calypso, the Phaeacians, and other strange happenings, the poem ends with his return to his native Ithaca. Whatever may be the secret of its authorship, the *Odyssey* is a rich storehouse of folklore and romance, and one of the world's masterpieces of literature. There are verse translations by Pope and others, and a prose version by T. E. Lawrence, 1935. See Homer.

Oecumenical. Term of Greek origin, meaning "of the whole world." It is applied to a Church council of bishops from all countries, or one whose decisions have been accepted by the universal Church. See Council.

Oedema (Gr., a swelling). Effusion of fluid into the tissues of the body. See Dropsy.

Oedipus (Gr., swollen foot). In Greek legend, son of Laius, king of Thebes, and Jocasta. An oracle having declared that Laius would perish at the hands of a son born of Jocasta, Oedipus, at birth, was exposed on the mountains with his

feet pierced. There he was found by shepherds, by whom he was taken to Polybus, king of Corinth, who brought up Oedipus as his own son. The Delphic oracle declared that he would slay his father. Oedipus happened to meet Laius, and in a sudden brawl killed him without suspecting his identity.

At this time the Sphinx (*q.v.*) was plaguing Thebes by devouring everyone who failed to answer a riddle. The Thebans proclaimed that the kingdom and the hand of Jocasta would be the reward of the man who rid the country of the monster. Oedipus essayed the adventure, and when the Sphinx propounded the riddle: What is the being which has four feet, two feet, and three feet; but its feet vary, and when it has most feet it is weakest? Oedipus answered that it was man. Enraged at receiving the correct answer, the monster threw herself from the rock. Oedipus thus became king of Thebes, and unwittingly married his own mother, by whom he had children. A plague then ravaged the land, and an oracle having declared that the plague would continue until the slayer of Laius was found, Oedipus set himself to discover the murderer, and learnt the truth from the prophet Tiresias. Jocasta hanged herself, and Oedipus put out his own eyes. The story is handled in the two great plays by Sophocles. Among later dramatists, Corneille, Dryden, Voltaire, and Jean Cocteau have treated the subject. See *Antigonë*; Sophocles.

Oedipus Colonus (Oedipus at Colonus). Tragedy by Sophocles. It takes its name from the grove of the Eumenides at Colonus, near Athens, whither the blind and weary Oedipus is led by his daughter Antigonë, there to find relief from his bodily and mental sufferings in death. One of the most beautiful of the choric passages contains a glorification of the poet's home. The date of the play is unknown.

Oedipus Complex. Neurosis of boyhood. Freud (*q.v.*) claimed to have discovered its existence, naming it after the Greek king Oedipus, who, in ignorance of his parentage, slew his father and married his mother. The corresponding condition in girls is called an Electra complex. Until the age of four to six the love of most children is directed primarily towards their mothers; it is a possessive and greedy emotion, which gives rise to much jealousy, sometimes unconscious, against those who interfere with the

child's demands upon the mother, e.g. a younger child or the father. At about five many girls tend to transfer their love to their fathers, so that both girls and boys are then devoted to the parent of the opposite sex.

Freud stated that this emotion was largely sexual, though in general unconsciously. In normal children, however, the Oedipus situation is outgrown without psychological damage, since the child learns to repress much of his emotional life. If, however, a child is treated leniently by the parent of the opposite sex and disciplined sternly by the parent of the same sex, considerable psychological difficulties may be caused. The normal growth of the love instincts will tend to be impeded and sexual development may be abnormal. Even if he escapes actual neuroses or perversions, the child's emotional relationships may well be unsatisfactory for the rest of his life. According to Freud, the common feature in all persons suffering from an unresolved Oedipus complex is that in the field of personal relations both the conduct and the emotions are dictated by unconscious urges arising from past relations with their parents. *See* Fixation; Homosexuality; Neurosis; Perversion. *Consult* Introductory Lectures on Psychoanalysis, S. Freud, 1917; *The Psychoanalytic Study of the Family*, Flugel, 1921.

Oedipus Tyrannus (King Oedipus). Tragedy by Sophocles, produced 430 or 429 B.C. Although generally regarded as the greatest of his plays, it failed to obtain the prize at the Dionysia. It is one of the few ancient tragedies which have been successfully produced before a modern audience in spite of the somewhat repellent plot. Two noteworthy productions, one with Martin Harvey in the main rôle (1912) and one with Laurence Olivier (1945) have reached the London stage as Oedipus Rex. Olivier used a translation by Yeats. *See* Oedipus.

Oehlenschläger, ADAM GOTTLIEB (1779-1850). Danish poet. He was born Nov. 14, 1779, at Vesterbro, Copenhagen.



A. Oehlenschläger, Danish poet

became an actor, but literature absorbed him, and he fell under the influence of Goethe and other German thinkers. In 1803 he

published his first volume of poems, which included the play entitled *The Eve of St. John*. More books followed, that winning most fame being his drama *Aladdin*. In 1805 the Danish government allowed him a pension which enabled him to spend some years in Halle, Berlin, Weimar, Dresden, Paris, and Switzerland. In 1810 he was appointed professor of aesthetics at the university of Copenhagen, and continued to produce works remarkable for their wealth of invention and wide range. He died Jan. 20, 1850.

Oenanthe Ether (Gr. through Lat., *oenanthe*, wine blossom). The essential oil which gives characteristic aroma to wine; called oil of cognac. *See* Wine.

Oenone. In Greek legend, a nymph of Mt. Ida, and wife of Paris, who deserted her for Helen. Her story is the subject of a poem by Tennyson. *See* Paris.

Oerlikon. Alternative spelling of the name Orlikon. *See* Orlikon Gun.

Oersted, HANS CHRISTIAN (1777-1851). A Danish physicist. Born at Rudkjøbing, Langeland, and educated at Copenhagen he won a travelling scholarship and visited Holland and Germany and Paris. In 1820 he made the discovery, on which his fame rests, that a magnetic needle was deflected by a current in a wire passing below or over it, the initial discovery in electro-magnetism. For the discovery he was awarded the Copley medal of the Royal Society. The oersted, the unit of magnetic field strength, is named after him. *See* Ampère.

Oesel, ŌSEL, EZEL, OR SAARE MAA. Island of Estonia S.S.R. Situated at the entrance to the Gulf of Riga, the island has an irregular coastline and a low, level surface. Farming, horse-rearing, and fishing are the principal occupations of the inhabitants. Karesare (formerly Arensburg) is the chief town. Area, 1,010 sq. m. In 1939 it was fortified, and made a Soviet military base, as a result of the assistance pact signed in Sept. between Estonia and Russia. Evacuated during the Russian retreat of 1941, it was not cleared of Germans until Nov. 24, 1944.

Oesophagus or GULLET. Muscular tube, lined internally with

mucous membrane, which leads from the pharynx or posterior part of the mouth to the stomach. About nine inches in length, it passes down behind the trachea and in front of the spinal vertebrae. In the chest it lies behind the left bronchus and the pericardium.

Obstruction of the oesophagus may result from swallowing a foreign body, such as a fish bone, coin, false teeth, etc. The obstruction can sometimes be withdrawn by a suitable oesophageal forceps, but when firmly impacted there is serious risk of injury to the walls of the oesophagus in the process of extraction, and the case should be promptly referred to a surgeon.

Oestrogen. Term for one of a group of hormones which produce female characteristics. Oestradiol, the typical oestrogen, which is formed by the ovary and the ovarian follicles, plays the dominant rôle in the sexual cycle of female animals. It is sometimes used in medicine in the treatment of symptoms of the menopause. Stilboestrol, a synthetic oestrogenic compound, has been used successfully to control the symptoms in cancer of the prostate. *See* Endocrinology.

Oestrous Cycle. Biological term. In almost all animals reproduction takes place at certain seasons. When the cooperation of male and female individuals is necessary a mechanism has been evolved which ensures that sperms shall meet eggs at a time when these are ready for fertilisation. Eggs are produced by the ovary of the female mammal at regular intervals. The timing of this ovulation is controlled by the products of the pituitary gland (*q.v.*). The cyclicity imposed upon the ovary by this gland produces a resulting cyclicity in the appearance of a hormone called oestrin. Oestrin enlarges the uterus in, for instance, the mouse, and also brings about a change in the epithelium lining the vagina. At ovulation, therefore, the uterus is ready for the egg to develop in, and the vagina is ready for the intromission of the male organ during mating. In fact the female will allow copulation only at this time. If the female mouse is not mated, she will reach this state every four days or so; this cycle of recurring sexual desire is the oestrous cycle. It is seen in a bewildering number of variations among dogs, cows, sheep, pigs, ferrets, etc.; the period varies from a few days to over a year. If a female mouse becomes pregnant, her cycle stops; so it does if she is mated to a



Hans C. Oersted, Danish physicist

sterile male, when she is said to exhibit pseudo-pregnancy. At the end of pseudo-pregnancy she will experience a pseudo-birth, and may produce milk. The cycle will then recommence. In primates such as man, the normal cycle is of this latter kind, involving a regular pseudo-pregnancy terminated each time by a recurring pseudo-birth, or menstruation (*q.v.*). Ovulation in the primate takes place midway between menstruations. It will be seen that the oestrus, or coming on heat, of a bitch or a cow, though it may be accompanied by some bleeding, has no resemblance to the menstruation of a woman.

Oeuvre, *L'*. French newspaper. Originally founded in 1904 as a weekly journal by U. Gohier and G. Téry, it was transformed into a daily in 1915, when it attracted many famous contributors. Radical in outlook, it remained independent and critical, and during 1925-39 grew enormously in importance, eventually achieving a circulation of 500,000. It was one of the first French papers to be abolished by the Germans in 1940. After the liberation of France it did not appear again.

O'Faolain, SEAN (b. 1900). Irish writer. He was born Feb. 22, 1900, and educated at the national university of Ireland and at Harvard. He was lecturer in English at Boston College, U.S.A., in 1929, and at St. Mary's College, Strawberry Hill, Middlesex, 1929-33. He made his reputation as a writer of vividly imaginative prose with *Midsummer Night Madness*, 1932, and *A Nest of Simple Folk*, 1933. He wrote biographies of Constance Markievicz, 1934; Wolfe Tone, 1937; De Valera, 1939; O'Neill, 1942; and books on Ireland: *An Irish Journey*, 1940, and *The Story of Ireland*, 1943.

Offa (d. 796). King of Mercia. A member of the royal house, he obtained the crown by crushing a rival in 757. Mercia was then in a shrunken and distressed condition, but Offa restored its fortunes, victorious battles bringing Kent, Essex, and probably Sussex and other regions under his rule, and driving the Welsh farther into their own land. He was overlord of all England except Northumbria, created a third English archbishopric, that of Lichfield, and founded St. Albans Abbey.

Offal. Word, literally off-fall, meaning refuse or waste. It is used for feeding stuffs for animals, these consisting of husks, etc., which are stripped from grain. It is also used for those parts of the

bull, sheep, or pig which are not eaten as food by human beings. In both Great Wars, however, an extended use was given to the word, and it included those parts of the animal which were eaten, but were not rationed, such as liver, kidney, sweetbread, etc.

Offaly. County of Eire. In the prov. of Leinster, its area is 771 sq. m. The Shannon forms its W. boundary, and it is also watered by the Brosna, Barrow, and small streams. It includes much bogland, including part of the bog of Allen, and the surface is flat, except in the S., where are the Slieve Bloom Mts. Oats, barley, and potatoes are the main crops; cattle, sheep, and pigs are reared. The Eire state rlys. and the Grand Canal afford transport facilities. Tullamore is the co. town; other towns are Birr or Parsonstown, Clara, Banagher, and Edenderry. Remains of the most extensive group of ancient religious establishments in Eire are at Clonmacnoise, on the Shannon. In early times the co. formed part of the kingdom of Offaly, and afterwards part of Glenmallery. In 1556 it was named King's co., in honour of Philip II of Spain, husband of Mary I, but in 1921 reverted to the earlier name. Pop. 52,029.

Offa's Dyke. Ancient entrenchment built by Offa, king of Mercia, about 779, to form a barrier between England and Wales. It extended from the mouth of the Dee to the Wye, close to its confluence with the Severn, and passed through the counties of Flint, Denbigh, Montgomery, Shropshire, Radnor, Hereford, and Gloucester. It was preceded by Watt's dyke, some little distance to the E., and both probably utilised prehistoric entrenchments. It consisted of an earthen rampart and a ditch.

Offenbach. Town of Hesse, Germany. It is on the Main, 5 m. E. of Frankfurt, and has been known since 977, having been an industrial and trading centre since the 17th century settlement of French refugees. It has a fine Renaissance castle, built 1559-78, several 18th century churches, and a town hall dating from 1775. It was long known as the centre of the German leather goods industry. After the Second Great War it was in the American zone of occupation. Pop. (1939) 81,329.

Offenbach, JACQUES (1819-80). French composer. His real name was Lévy, and he was born at Offenbach-on-Main. June 21, 1819, son of the cantor of the Jewish synagogue at Cologne. In 1833 he

entered the Paris conservatoire, where he studied the 'cello; in 1837 he joined the Opéra-Comique orchestra, and began to write operettas. *Pépito*, 1853, attracted little attention, but *Les Deux Aveugles*, 1855, scored success. Offenbach took the Théâtre Comte, re-named it the Bouffes Parisiens, and produced there a succession of witty and sparkling light operas which for later generations conjured up the gaiety of the Second Empire. Of some 70 pieces for the stage, based mainly on the libretti of Meilhac and Halévy, the most famous are *Orphée aux Enfers*, 1858; *La Belle Hélène*, 1865; *La Vie Parisienne*, 1866; *La Grande Duchesse de Gêrolstein*, 1867; *Madame Favart*, 1878. His most ambitious effort, *Les Contes d'Hoffmann* (Tales of Hoffmann), was produced posthumously in 1881; in England it failed to achieve popularity until presented in 1910 at His Majesty's. Offenbach died Oct. 4, 1880.



J. Offenbach,
French composer

Offence. In law, the widest term used to describe breaches both of the criminal law and of regulations made for the public good, *e.g.* Public Health Acts. In England it is also used in a narrower sense, to describe an act which is not an indictable crime or misdemeanour, but is nevertheless punishable by fine, imprisonment, or other penalty, *e.g.* adulteration of food and drugs, selling short weight or measure, and breaches of town by-laws.

Offertory. Ecclesiastical term for that part of the Holy Communion service in which the alms and oblations of the congregation are offered, and oblation of the bread and wine is made at the altar by the officiating priest. It is also applied to the sentences read by the priest while the alms are being collected. In the Anglican Church these sentences have taken the place of the antiphon or anthem, called the offertory, which used to be said or sung while the people made their oblations. In early times the offerings included the bread and wine, as well as things needful for the maintenance of divine worship. The word offertory is loosely applied to all church collections; and to organ pieces suitable for playing while such collections are being made.

Office of War Information. This approximate equivalent in the U.S.A. of the British wartime Ministry of Information is referred to under Information.

Officer. A person serving in the army, the marines, navy, or air force on the terms of a commission granted by the sovereign. In a legal sense a military man is either an officer or a soldier, and the latter term embraces warrant officers (*q.v.*) and non-commissioned officers (*q.v.*). The symbol of commissioned rank is a sword, of which an officer is deprived when placed in arrest. On active service, for purposes of discipline, certain civilians who are permitted to accompany the army are graded so as to receive the treatment of officers, *e.g.* a newspaper correspondent would be dealt with in all respects as an officer, if holding a pass from the army commander—otherwise as a soldier. An officer who resigns his commission becomes again, in a legal sense, a civilian, but it is customary to address him in the rank he held on leaving the army, if this was captain or higher.

In peace-time, an officer usually wears plain clothes (called *muffi*) when out of his quarters and off duty. He receives his pay monthly in advance through an army agent, buys his own uniform, and is privileged to keep a soldier's servant. He must, if unmarried, live in quarters (*q.v.*) and dine in mess (*q.v.*). His pay is supplemented by various allowances, and by serving the required number of years he is entitled to retired pay or gratuity. An officer must retire at a fixed age according to rank, but he may be permitted to retire at any time after a certain period of service, on a pension, the latter varying according to the service. *See* Captain; Commission; General; Lieutenant; Major, etc.

Officer Cadet Training Unit. Organization established in the Second Great War for commissions in the army or R.A.F. Regiment. The course of infantry cadet training units lasted 2-4 months; several such units were maintained at home and overseas. The O.C.T.U. for the Royal Armoured Corps was at Sandhurst, where the course lasted 4-6 months. The R.A.F. Regiment O.C.T.U. was in the Isle of Man. Cadets attending an O.C.T.U. wore a white band round their caps and white tapes on the shoulder-straps of the tunic. After the Second Great War, O.C.T.U.s were abolished and cadets for commissions went

to Sandhurst, after a period of service in the ranks.

Officer's Friend. Name given to an officer who represents an accused brother officer at a court-martial. *See* Court Martial; Prisoner's Friend.

Officers' Training Corps. Former organization of the Territorial Army attached to universities and schools. In these corps cadets were trained for commissions in the special reserve. They were required to pass two examinations before being granted commissions. The officers were generally members of the staff of the university or school who held commissions in the T.A. Instruction included practical work and lectures on military subjects. During the Second Great War the O.T.C. was replaced by the junior and senior training corps, which perform the same functions. *See* Training Corps.

Official Receiver. The public official who manages the affairs of bankrupts, taking over their property, realizing the assets, and distributing the money to the creditors. England and Wales are divided into bankruptcy districts, each with a receiver appointed by the board of trade, while others are attached to the bankruptcy department of the high court of justice in London. A trustee appointed for a bankrupt's estate is under the supervision of the receiver. Official receivers perform similar duties in cases where public companies go into liquidation. They were first appointed under the Bankruptcy Act of 1883. *See* Bankruptcy.

Official Referee. Official of the English high court of justice. He is one of three subordinate judges, whose business it is to try cases, or hold inquiries involving long investigations into accounts, etc. They usually sit in London, but an official referee may hold inquiries elsewhere, if that is the more convenient course. An appeal lies from an official referee to the court of appeal.

Official Secrets Acts. Acts punishing spying and similar offences. The principal Act, passed 1911, and amended 1920 and 1939, makes it a felony punishable by 14 years' penal servitude for any person, for any purpose prejudicial to the safety of the state, to be in a prohibited place (*e.g.*, arsenal or dockyard), make a sketch or note of use to an enemy, or to obtain or communicate any secret code word, document, or information.

It is a misdemeanour punishable by two years' imprisonment if a person, through misadventure and without any purpose prejudicial to the state, communicates to any unauthorised person any document or information relating to a prohibited place, or which has been entrusted to him by a person holding office under the crown, or which he has obtained through himself holding office under the crown. Registration with the police is compulsory for every person carrying on the business of receiving postal packets for reward and forwarding them to the persons to whom they are addressed.

A chief officer of police, if he has reasonable ground for suspecting that the offence of spying has been committed, may, with the permission of the home secretary, authorise an officer to require any likely person to furnish information about the offence. Anyone who refuses is guilty of a misdemeanour. A person suspected of having committed, or attempted to commit, or being about to commit an offence may be arrested without a warrant; but no prosecution may be brought without the consent of the attorney-general, solicitor-general, or director of public prosecutions.

Offset. This method of printing is described under Lithography.

Off-side. Term used in various senses. (1) Of a horse or a vehicle, the side facing the centre of the road when it is obeying the rule of the road; *e.g.*, in Great Britain, where traffic keeps to the left, the off-side is the right, the left being called the near-side. (2) In cricket, the side of the field towards which the batsman's body is turned when he is taking the strike, *i.e.* on the bowler's left for a right-handed batsman and *vice versa*. The other side of the field is called the leg or on-side. (3) The off-side rules in football and hockey are described in the articles on those games.

Offag. Camp for officer prisoners of war in Germany during the Second Great War. The word is an abbreviation of *Offizierlager*, officers' camp.

O'Flaherty, LIAM (b. 1897). Irish writer. Born in the Isle of Aran, Aug. 28, 1897, and educated at Dublin university, he volunteered for the republican forces in 1913, but joined the British army at the outbreak of the First Great War. He returned to Eire in 1920, became a Communist, and went to London to devote himself to writing. Of his novels the best-

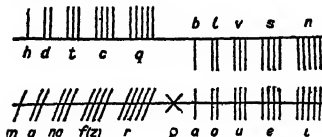


Liam O'Flaherty,
Irish writer

lected edition of his brilliant short stories in 1937. He also wrote a biography of Tim Healy, 1927, and a travel book, *I Went to Russia*, 1931.

Ofterdingen, HEINRICH VON (c. 1170-1250). German minnesinger. Some writers have suggested that Ofterdingen was the author of the *Nibelungenlied* (q.v.).

Ogam OR OGHAM. System of writing employed in early Britain and Ireland. The name is connected with Ogmios, the Gaulish god of eloquence. The alphabet comprised 21 characters, composed of straight incised lines or notches on one side of or across a stem line. In stone inscriptions this was usually one of the upright edges, the characters being read upwards:



Perhaps invented at the end of the Roman occupation—one of the oldest examples having come from Silchester—ogam-writing continued in use until the 10th century. Of the 300 examples known, about 30 are from E. Scotland, Orkney, Shetland, and the Isle of Man, and an equal number, mostly with Latin legends as well, from Wales, Devon, and Cornwall. The remainder were found in Ireland. Mostly they are stone epitaphs, sometimes associated with Christian symbols, but a few occur on metal ornaments. The key to their decipherment was furnished by the 14th century MS. Book of Ballymote. See *Epigraphy*; *Inscriptions*; *Ireland*.

Ogden. City of Utah, U.S.A. The co. seat of Weber co., it stands 4,338 ft. in alt. at the junction of the Ogden and Weber rivers, 38 m. N. of Salt Lake City, and is served by the Union Pacific and other rlys. It dates from 1848, the Mormon church having paid \$2,000 to establish title to the surrounding region. Older

houses are former dwellings of Mormon families. A city since 1851, Ogden is the largest sheep and cattle shipping point in the west. Pop. 43,688.

Ogdensburg. City of New York, U.S.A., in St. Lawrence co. A port of entry, it stands on the St. Lawrence river, at its junction with the Oswegatchie, opposite Prescott, Ont. Its buildings include the U.S. government building, the R.C. cathedral, and the state hospital and armoury. A large lake shipping trade is carried on. Half the people are of French Canadian origin and hold an annual street gala at which they entertain Canadians. Settled in 1749, Ogdensburg was incorporated in 1817 and became a city in 1868. Pop. 16,346.

Ogee. Type of arch or section of architectural moulding of which the curve is an S-shape. It was used extensively in 14th century Gothic architecture. See *Arch illus.* (Decorated); *Moulding illus.*

Ogier the Dane. A hero of medieval romance, belonging to the Charlemagne cycle. Historically he represents the Frank Atchar, who conducted the widow of Charlemagne's brother, Charlo-man, to Desiderius, king of the Lombards, and joined him in his war against Charlemagne. His connexion with Denmark seems due to a mistake, though as Holger Danske he was adopted as a Danish national hero. Ogier is the subject of French and Italian romances, and of Spanish and Scandinavian tales.

Ogive. Name for a pointed arch, as used in Gothic architecture; also used in mathematics, through confusion with ogee (q.v.), to denote an S-like curve in a graph, e.g. the curve that represents cumulative frequency distribution in relation to size.

Ogive, OGOWE, OGOWAY, OGOWAL, OR OGOWO. River of French Equatorial Africa. It falls into the sea a few miles S. of Cape Lopez, and forms the principal coastal river between the Niger and the Congo. It is obstructed by numerous rapids, but is navigable as far as Njole, 160 m. from its mouth. Its length is 700 m.

Oglethorpe, JAMES EDWARD (1696-1785). English soldier and philanthropist. Born Dec. 21, 1696, he served under Prince Eugene, and entered parliament in 1722. His attention having been drawn to the sufferings of debtor prisoners, he formed an association for the establishment of a colony of released debtors, and in

1733 he settled Georgia, acting as governor there for 13 years. In 1745 he was sent against the Scottish rebels, and though acquitted on a charge of failing to overtake Prince Charles's army, he resigned his commission. He died July 1, 1785. See *Georgia*; *consult* *Memoir*, R. Wright, 1867.

Oglio. River of Italy, an affluent of the Po. It rises in the Alps in the neighbourhood of Mte. Adamello, and flows in its upper course through Val Camonica to the Lago d'Isco. Issuing from the S. end of the lake, it crosses the plain of Lombardy by a curved course, receiving from the left the Mella and Chiese, to join the Po 10 m. S.W. of Mantua. Its total length is 130 m.

Ogmore-by-Sea. Part of the rural dist. of Penybont in the co. of Glamorgan, Wales. It is three m. from Bridgend, and has remains of a castle dating from Norman times. Near is Ewenny, with the ruins of a Benedictine abbey. Ogmore is also the name of a small river which flows into the Bristol Channel at Ogmore-by-Sea.

Ogmore Vale. Part of the urban dist. of Ogmore and Garw in the co. of Glamorgan, Wales. It is eight m. from Bridgend and has a rly. stn. It is a coal mining centre.

Ogpu. A former name of the political police organization established in the U.S.S.R. in Dec., 1917, under the name of Cheka. It was originally organized to deal with sabotage and counter-revolutionary manifestations, but as the internal difficulties of the early Communist regime increased, its activities were extended to embrace smuggling, speculation, and military and political counter-espionage. Eventually the Cheka was given authority to make summary arrests and judgements and to execute persons sentenced. Arrests were usually carried out at night and news of prisoners was rarely received until they had been either sentenced or freed. The name Cheka thus became one of terror, and no doubt the strength of the organization and the numbers of its victims were fantastically exaggerated.

In 1922 the Cheka was re-organized under the name Ogpu, a word formed from the initials of the Russian words for unified



James E. Oglethorpe,
English soldier

political state administration. The OGPU retained great power and had a leading share in preparing the political trials of 1936-37 (see Moscow Trials). In 1936 the OGPU was incorporated in the commissariat for internal affairs and given charge of forced labour camps. Special detachments dealt with internal opposition, and served on the frontiers. Later, with the renaming of the political dept. controlling it, OGPU was named first the N.K.V.D., then the M.V.D. (abbreviation for ministry of the interior). The M.V.D. remains the instrument by which the decisions of the Politbureau are enforced within the U.S.S.R. It is said to be 600,000 strong, equipped like an army, and it includes many spies, informers, and agents-provocateurs.

O'Grady, STANDISH (1846-1928). Irish author. Born Sept. 18, 1846, he was educated at Trinity College, Dublin. His literary work marks the starting point of the modern Irish literary revival. His publications include *The History of Ireland, Heroic Period*, 1878; *The Coming of Cuculain*, 1894; *Chain of Gold*, 1895; *Ulrick the Ready*, 1896; *The Flight of the Eagle*, 1897. He died May 18, 1928.

Ogygia. In Greek mythology, the island upon which Odysseus spent eight years with the nymph Calypso. See Calypso; Odysseus.

O'Higgins. Inland prov. of central Chile. Named after Bernardo O'Higgins (*v.i.*), it is bounded N. by Santiago and S. by Colchagua. The E. portion is traversed by the Andes, the surface sloping W. to the fertile valley of Chile. The N. boundary is partly traced by the river Maipo, while the Rapel flows along its S. frontier. The chief products are wheat, wine, and fruit, and cattle-rearing and gold-mining are carried on. The capital is Rancagua, 40 m. by rly. S. of Santiago. Area, 2,745 sq. m. Pop. 200,297.

O'Higgins, AMBROSIO (c. 1720-1801). S. American administrator and soldier. Of humble parentage, he was sent from Ireland to his uncle, a Jesuit in Seville, who, finding him unsuited for the Church, sent him to S. America, where he became a S. American administrator, and made his way across the Andes to Lima, where he kept a stall and

trafficked in mules. He eventually obtained a govt. contract to build rest-houses on the mountain roads.

In 1770 O'Higgins was sent to suppress a rising of the Araucanian Indians, whom he defeated, but he won their good will after peace was concluded. In 1788 he became captain-governor of Chile with the title of marquis of Osorno. He governed with an iron hand, repaired roads, encouraged trade, and checked official corruption. Promoted viceroy of Peru in 1796, he thus became the king of Spain's representative in S. America. O'Higgins was the first and greatest of the many Irish who acquired fame in S. America. He died Feb. 18, 1801. His natural son, Bernardo O'Higgins (1778-1842), born at Chillan, Aug. 20,



Bernardo O'Higgins, 1778, became Chilean dictator and commander-in-chief (1813) and dictator (1817-23) of Chile, and declared its independence in 1818. He died Oct. 24, 1842.

O'Higgins, KEVIN CHRISTOPHER (1892-1927). Irish politician. He was born at Stradbally, June 7, 1892, the son of Dr. T. Higgins, who was assassinated, 1923. Educated at S. Peter's College, Carlow, he was articled to a solicitor, his uncle, M. Healy of Cork. He took part in the Easter rebellion, 1916, and while in prison was elected Sinn Féin M.P. for Queen's co. In the Cosgrave government of 1922 he was minister of Justice and vice-president of the executive council; he established the civic guard and had rebels executed. On July 10, 1927, he was murdered by three assailants near Bookers-town, while on his way to Mass.

Ohio. River of the U.S.A. Commercially the most important, and next to the Missouri, the largest tributary of the Mississippi river, the Ohio is formed by the union of the Monongahela and the Allegheny rivers at Pittsburgh. It flows generally S.W. for 975 m., joins the Mississippi at Cairo, and during its course separates West Virginia and Kentucky from Ohio, Indiana, and Illinois. It has a breadth varying from rather less than $\frac{1}{2}$ m. to a little more than $\frac{3}{4}$ m., and drains an area exceeding 200,000 sq. m. Among its principal affluents are the Tennessee, Cumberland, Wabash, Kentucky, Kanawha, and Big Sandy. In addition

to Pittsburgh and Cairo, the towns standing on its banks are Cincinnati, Paducah, Marietta, Louisville, Evansville, and Mount Vernon.

The Ohio, except for a short distance at Louisville, where there is a fall of 26 ft. in 2 m., is navigable for large vessels throughout its length, although delay is caused during drought periods by the low level of the water, and at other times by flood. A canal with locks was constructed to overcome the obstruction caused by the falls.

Ohio. North-central state of the U.S.A. Its area is 41,222 sq. m., or nearly one-third larger than Scotland. Though 34th in size of the U.S., it is the 4th in pop. The state is crossed from N.E. to S.W. by a low hill ridge, whence the surface slopes to Lake Erie in the N. and to the Ohio river in the S. The Maumee, flowing into Lake Erie, is the chief northern river; the S. part of the state is watered by many affluents of the Ohio, which have cut deep valleys through the sandstone rocks.

Ohio produces large quantities of maize, wheat, and oats, besides tobacco, hay, potatoes, fruit, etc.; stock-raising is a valuable interest. The coalfields comprise an area of nearly 12,000 sq. m., and natural gas, petroleum, limestone, and other minerals are obtained. The important manufactures include iron and steel products, flour, and rubber goods. The State, Ohio, Cincinnati, and Miami universities are among higher educational institutions. Besides the lake, river, and canal facilities, 9,121 m. of rlys. are available for transport. Two senators and 23 representatives are sent to congress. Columbus is the capital and Cleveland and Cincinnati the largest cities. Ohio was admitted to the Union in 1803. Pop. 6,907,612.

Ohlau (Pol. Olawa). Town of Lower Silesia at the confluence of the Ohle and the Oder, 16 m. S.E. of Breslau (Wroclaw). Buildings include a 16th cent. castle and several churches. It was a centre of the tobacco and cigar trade, and had machinery and chemical factories. It had also lime kilns and a horse and cattle market. Ohlau was made a town in 1290 and was at one time a residence of the Sobieski family. It became Prussian with the rest of the Silesian duchies in 1742, and after the peace treaty of 1919 was in a plebiscite area. It is in the part of Germany occupied by Poland after the Second Great War. Pop. (1939) 11,894.

Ohm. Unit of electrical resistance. The resistance of a circuit is

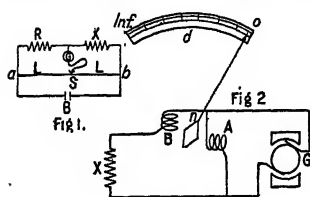


Ambrosio O'Higgins, S. American administrator

1 ohm when a pressure of 1 volt is required to cause a current-flow of 1 ampere. See International Units.

Ohm, GEORG SIMON (1787-1854). German physicist. He was born at Erlangen, March 16, 1787, and educated there. After holding a series of academic posts, he became in 1852 professor of experimental physics at Munich, but is chiefly remembered as the discoverer, in 1827, of Ohm's Law (*q.v.*). He died July 7, 1854.

Ohmmeter. Instrument for measuring the electrical resistance of conductors in ohms or of insulation in megohms. In one type, known as the Wheatstone bridge, comparison is made of a known resistance with the resistance to be measured. Its simplest form is shown in the diagram (Fig. 1) and



Ohmmeter. Diagrams illustrating types of instruments for measuring electrical resistance. See text

consists of a wire L of uniform resistance and one metre in length. To its two extremities (*a* and *b*) are connected a coil of known resistance *R* and the unknown resistance *X* in series. A battery *B* sends a current through the two circuits in parallel, while a galvanometer *G* is joined at a point between the two resistances and to a sliding contact *S* on the wire *L*. Current will then flow through both *R* and *X* in series and through the slide wire *L*. The sliding contact is adjusted until there is no deflection of the galvanometer needle. When this happens the circuit through *R* is equal in resistance to *aS* while the circuit through *X* is equal to *Sb*. No current can flow through *G*; there will be no deflection of the galvanometer needle. As the slide wire *L* can be scaled in centimetres and millimetres, proportions of *aS* and *Sb* are easily ascertained. The resistance $X = R \times aS/Sb$.

In another type of instrument, (Fig. 2), a magnetic needle *n* is subjected to the influence of two coils *A* and *B*, arranged at right angles to one another. Each coil, when current passes through it, tries to turn the needle into a line parallel to its own axis. A mag-

neto generator *G* supplies current to the instrument and is connected by coil *A* and also by coil *B* in series to the resistance *X* under test. Assuming *X* to offer infinitely great resistance, all the current will pass through *A*, and the pointer attached to the needle will move into the infinity position at one end of the scale of the dial. If, however, any current passes through *X*, coil *B* acts in opposition to *A*, and the deflection of the pointer is modified accordingly. The graduation of the dial scale is based upon tests made with calibrated resistances.

Ohm's Law. A relationship in electricity first investigated by G. S. Ohm (*q.v.*), who found that the ratio of the (direct) current, *I*, to the e.m.f., *E*, in any circuit is proportional to the total resistance, *R*, of the circuit (including the internal resistance of the cell, etc.); i.e.

$$E/I = R; I = E/R; E = IR.$$

If *E* is in volts and *I* in amperes, *R* will be in ohms.

Ohre. River of Czechoslovakia described under its more familiar German name, Eger.

Ohthere (fl. 880). Norse navigator. He entered the service of Alfred the Great, who described two of his voyages in his translation of Orosius. Ohthere sailed round the North Cape, explored the Murman coast, and discovered the White Sea.

Oich, Loch. Lake of Invernessshire, Scotland. It is 4 m. long and about $\frac{1}{2}$ m. broad, and is the summit level (105 ft.) of the Caledonian Canal. It has a depth of 155 ft., and fills part of the Great Glen. The Glengarry flows into the loch, which is drained by the Oich ($6\frac{1}{2}$ m. long) into Loch Ness at Fort Augustus. Trout and salmon are plentiful.

Oil. Organic liquid of definite composition or origin. By definition and general acceptance so-called oily liquids such as sulphuric acid (oil of vitriol) are excluded. There are two large groups of oils: those obtained from animals and plants, and those of mineral origin; although it can be argued that the genesis of all oil is ultimately animal or vegetable since that is the source of coal, petroleum, shale, etc., from which mineral oils are derived. Oils of relatively simple composition can be synthesised in the laboratory and some of them also on an industrial scale.

Oils obtained directly from animals and plants are of two types. Fixed (fatty, non-volatile) oils

come from the cells of the organism Triglycerides, they can be distinguished from other oils because with suitable treatment they will yield glycerine. To these may be added substances such as sperm oil which, strictly a liquid wax, is a typical oil in appearance and commonly classed with the fixed oils. Although such waxes are esters they are not glycerides, the alcohols being monohydric and, to some extent, dihydric. Essential (volatile) oils are contained mainly in the leaves, stems, and flowers of plants. They all have characteristic odours—peppermint, lavender, turpentine, etc.—and are obtained by distillation with steam. They differ completely in composition from the fixed oils, containing terpenes, camphors, olefinic terpenes, and olefinic camphors.

Mineral oils are complex mixtures of hydrocarbons with varying amounts of oxygen, nitrogen, and sulphur compounds. There are three main groups: petroleum (crude oil), shale oil, and coal tar. Crude oil does not contain unsaturated hydrocarbons; it is a mixture of paraffins, naphthenes, and aromatics. Shale oil, produced by the destructive distillation of the organic matter in oil shale, contains important quantities of olefines. Coal tar, in addition to a high aromatic content, has an appreciable amount of phenols and some nitrogen compounds such as pyridine. Unlike the fixed and essential oils, mineral oils are not generally of much use as they are obtained, but must be divided into fractions of more limited range. Petroleum is split into gasoline, kerosene, gas oil, lubricating oil, fuel oil, etc. Shale oil gives a similar range, while coal tar gives benzols, solvent naphtha, naphthalene, cresols, cresote oil, etc. Differentiation between the products of petroleum and shale oil is difficult, frequently impossible, but those from coal tar can readily be separated.

This classification of oils gives an impression of definite boundaries between the major groups; but some crossing is possible. Thus, from the resin tapped from various species of conifers, turpentine is distilled, leaving a residue of rosin. On dry distillation of the rosin, hydrocarbon oils are obtained which are not readily distinguished from mineral oils. Similarly with the uses to which the various groups of oils are put. Fixed oils are used for foods, soaps, lubricants, paints, etc.;

essential oils for perfumery, varnishes, paints, solvents, etc.; and mineral oils for fuels, solvents, lubricants, etc. *See* Essential Oils; Fats; Fixed Oils; Fuel Oil; Petroleum; Waxes; also Cetane Number; Cracking; Flash Point; Fractionation; Octane Number; Refinery; Selling Point; Smoke Point.

Oil Beetle. Insects of the family Meloidae, which include nine British species. Those of the genus *Meloe* are commonly named oil beetles from the fact that an oily fluid exudes from the joints of their legs



Oil Beetle. *Meloe violacea* (male)

and probably serves the purpose of making them distasteful to their enemies. Large in size, with short wing covers and a long abdomen, these beetles inhabit grassy places, where they lay eggs. The larvae attach themselves to bees and get carried to nests, living as parasites. The Spanish fly (*Lytta vesicatoria*), which yields the drug cantharidin, also belongs to the Meloidae. *See* Cantharides.

Oilcake. The term originally applied to linseed cake. It is now used also for other kinds of cake rich in oil. *See* Earth-nut Cake; Linseed Cake; Palm-nut Cake; Rape Cake.

Oil City. City of Pennsylvania, U.S.A., in Venango co. It stands on the Allegheny river, 130 m. by rly. N. by E. of Pittsburgh, and is served by the Pennsylvania and other rlys. Its buildings include the city hospital and the Standard Oil co.'s building. Situated in the Pennsylvania oil region, it is concerned chiefly with the refining of bases for lubricating oil. Settled in 1825, Oil City was incorporated in 1863 and chartered as a city in 1871. Oil was first discovered in the locality in 1859, and between 1860 and 1870 it was the centre of American oil production. After 1870 it continued to supply crude oil which was unobtainable elsewhere. Pop. 20,379.

Oilcloth. A name sometimes used to describe floorcloth (*q.v.*). Table oilcloth, Lancaster cloth, or American cloth consists of a cotton grey cloth coated on one side with a flexible film of several thicknesses of oil paint. It is used for table, shelf, and wall covering. The cloth is prepared for coating by sizing, stentering, and rubbing. The under-surface may be raised to produce a soft back. Paint is applied in spread-

ing machines, the surface is usually printed with a pattern, and a protective coating of varnish or lacquer is finally applied.

Oil-Drop Experiment. Method of determining the charge of an electron. Devised by the U.S. physicist R. A. Millikan (*q.v.*), it consists of holding an oil-drop of suitable size between two parallel metal plates maintained at a constant electrical potential difference. If ne represents the charge on the drop, e being the electronic charge and n a number to be found, then

$$ne \frac{V}{d} = mg, \text{ where } V$$

represents the value of the potential difference which maintains the drop in balance, d is the distance between the plates, g is the acceleration due to gravity, and m is the mass of the drop. The last quantity is determined by timing the rate of fall of the drop under gravity without an electric field, and by applying Stokes's law, the viscosity of the air being known. If n is not too large, it is easily deduced from an inspection of the values of ne for a number of differently charged drops.

Oil Engine. Name formerly given to a type of internal combustion engine using paraffin (or kerosene) as fuel; whereas a gas engine uses coal gas or producer gas. The paraffin was converted into vapour in an externally heated vaporiser, mixed with air, and drawn into the cylinder on the induction stroke, thereafter operating as in a gas engine. The vaporiser was heated by a separate burner for starting, the heat of the exhaust gases being used for this afterwards. Except for small engines for outboard motors, etc., the advent of reliable compression ignition engines has rendered paraffin engines obsolete. Much higher mean effective pressure is practicable with the former type and its fuel consumption is lower. *See* Diesel Engine; Internal Combustion Engine.

Oilfield. Area in which oil is being produced from natural subterranean reservoirs. Its characteristic surface feature is the tall derrick, used for drilling wells, the number and spacing of which depend upon the depth, geological structure, and fluid conditions in the reservoir. Sand and sandstone reservoirs generally

require relatively close spacing, whereas efficient production from many limestones is possible with the wells far apart; in the sandstone reservoirs of the W. hemisphere wells do not usually occupy more than 50 acres each, but in the limestones of Iran there is only one well per 500 to 1,000 acres. The surface equipment of an oil-field consists of drilling rigs and derricks; separators; of pipe lines, pumps, and tanks; pumping and gas-lift equipment for raising oil when the reservoir pressure is insufficient; workshops, stores, offices, laboratories, and accommodation for the staff, which in undeveloped country may amount to the pop. of a town.

Oil Gas. Gas obtained by the cracking of gas oil and used for heating and lighting. The first patent for manufacture of gas from vegetable or animal oil, fat, bitumen, or resin was granted in England to Taylor in 1815, but the best-known process, which involved cracking gas oil in retorts at high temperatures, was developed by Pintsch in Germany in 1870. Production of oil gas is now largely limited to the Pacific coast region of the U.S.A., where the cost of solid fuels is high and petroleum is abundant. A fire-brick-lined steel shell, filled with checker brick, is heated by oil burners to about 2,000° F.; air is blown in to burn off carbon deposited in an earlier cycle; and oil, atomised by steam, follows. The oil cracks as it passes through the hot brick, forming oil gas and free carbon, and the steam reacts with part of the carbon to give water gas. Six or seven gallons of oil make 1,000 cu. ft. of gas of calorific value 550 B.Th.U. per cu. ft. *See* Cracking.

Oil Painters. ROYAL INSTITUTE OF. British society of artists founded in 1883. It became a royal society in 1909, and holds annual exhibitions (open to non-members) at the Royal Institute Galleries, 195, Piccadilly, London, W.1. Members are entitled to the letters R.O.I.

Oil Palm (*Elaeis guineensis*). A tree of the family Palmac, native of W. Africa, but much grown in the W. hemisphere. It grows to a height of about 30 ft., with a stout stem bearing at its extremity a crown of magnificent feather-like leaves, 15 ft. long. The male and female flowers are borne usually by separate trees, but sometimes on the same tree. Bright red fruits, which yield palm oil, form large, oval heads. This oil is

obtained principally from the external fleshy coat, by boiling the fruits in water, and skimming the



Oil Palm. Crown of feather-like foliage. Inset, part of fruit head

orange-red, butter-like fat off the surface. The seed, enclosed in a hard shell, also yields oil under pressure. The latter is used as a lubricant and in making margarine.

Oil Rivers Protectorate. Name formerly applied to the coastal districts in the estuary of the Niger. In 1885 the Berlin conference acknowledged that a British protectorate had been virtually established over these regions, and an order in council defined the boundaries of the territory. The British commissioner was stationed at Old Calabar. In 1893 the Oil Rivers protectorate became part of the Niger Coast protectorate, afterwards S. Nigeria. See Nigeria.

Oil Shale. Shale which contains organic matter insoluble in normal solvents of oil but which, on retorting, produces oil. The organic matter is called kerogen (*q.v.*). The term oil shale is frequently applied to varieties of rock which on heating produce an oil or tar in addition to the true oil shale, *e.g.*, kukersite, torbanite, boghead coal, cannel coal. Commercial exploitation of oil shale and similar rocks was started by Young in Midlothian, Scotland, in 1851, but as the production of petroleum from wells increased rapidly in the 20th century, the oil shale industry had a hard struggle to survive. It is continued in Scotland, Estonia, S. Africa, France, Manchuria, and Sweden, where there is no indigenous crude oil. There are deposits in England (Dorset and Norfolk), but their oil is too sulphurous to use. The U.S.A. has vast reserves, while in the U.S.S.R. the production of shale oil is said to be proceeding apace.

After mining by normal open-cast or underground methods, the

oil shale is heated in retorts—directly or indirectly heated, vertical or horizontal, rotary, tunnel, or stationary. The shale may be merely heated, or steam and air may be passed through it during heating, and it will give shale oil, combustible gases, carbon, and ammonia. Oil recovery varies from 20 to 100 gallons or more per ton of rock, the lower figure being representative of Scottish yields. Crude shale oil from the retorts is treated much as crude petroleum is.

Mining costs are a major item adversely affecting the use of oil shale. In Sweden a process invented by Ljungström aims at avoiding these by heating the shale *in situ*. Heating is by electricity through elements carried in 2-in. boreholes, so the method depends on cheap electric power. In Germany attempts have been made to distil Württemberg oil shale *in situ* by adapting the Russian process for the underground gasification of coal. *Consult* Oil Shale and Cannel Coal, Institute of Petroleum, 1938.

Ointment. Preparation consisting of an active drug mixed with a fatty substance, intended to be applied to an external surface. The substances most frequently used as the basis of an ointment are lard, olive oil, wax, paraffin, and hydrous wool fat (lanolin).

Oïrot. Autonomous prov. of the R.S.F.S.R. It is bounded W. by W. Siberia region and Kazakh S.S.R., the Altai Mts. and China lying to S. and E. The people are Kalmucks and the chief town is Oïrot-Tura.

Oise. Dept. of France. In the N. of the country, between the old regions of Normandy, Picardy, and Île de France, its area is 2,272 sq. m. The surface is hilly, and across the dept. flows the Oise. Other rivers are the Aisne, Brèche, Nonette, and Oureq. The soil is fertile; wheat and other cereals are grown, cattle are reared, and there are many dairy farms. Here are the forests of Chantilly and Compiègne. The chief town is Beauvais; others are Chantilly, Noyon, Clermont, Compiègne, Creil, and Senlis. Partly overrun by the Germans in Aug.—Sept., 1914, and again in June—Oct., 1918, the dept. saw furious fighting in the First Great War. Pop. 396,724.

Oise. River of France. Rising near Chimay, in the Ardennes, in Belgium, it enters France, and after flowing past Guise receives the waters of the Serre and the Ailette.

Near Compiègne the Aisne flows into it; other tributaries are the Thérain and the Brèche. It falls into the Seine, 40 m. below Paris, after a course of 186 m. For about 60 m. the river is canalised and linked up by canals with the waterways of Belgium and N. France. The battle known to the French as that of the Oise, in the First Great War, began Aug. 16, 1918. It was opened by the French by heavy bombardment and patrol encounters between the Aisne and Oise on a front of 20 m. In the infantry attack, Gen. Mangin took 13,000 prisoners and 300 guns. When the Germans invaded France in 1940, their armoured formations crossed the Oise on May 17. This endangered British communications and compelled the B.E.F. to withdraw behind the Schelde.

Ojibwas or **CHIPPEWAS.** North American Indian tribe of Algonquin stock. The name, meaning "roast-till-puckered-up," alludes to their puckered moccasins. Established N. of Lake Superior from time immemorial, they moved W. until their range embraced 3,000 m. Owing to their remoteness from early colonial contact, they long maintained their tribal organizations in comparative purity. Living in birchbark wigwams, and using canoes for fishing, their possession of the wild-rice (*zizania*) region led to warfare with the Dakotas. They number about 30,000. See American Indians colour plate.

Oka. River of central Russia. It rises near Ochka, in the region of Kursk, and flowing alternately N. and W. for 950 m., discharges itself into the Volga at Gorky. It connects the industrial and grain-producing districts of the country, and is nearly everywhere navigable.

Okanagan. River of Canada, in British Columbia, affluent to the Columbia river. With its numerous tributaries it drains the W. slopes of the S. Monashee Mts. and the Gold Range, which separate its basin from that of the Kootenay and Upper Columbia. Its upper valley is filled mainly by the narrow Okanagan Lake, 80 m. long; thence it flows S. through smaller lakes into the U.S.A., to join the Columbia river at Brewster.

Okapi (*Ocapia johnstoni*). Ruminant mammal related to the giraffe. First discovered by Sir Harry Johnston, in 1900, in the Semliki forest of Central Africa, though supposed to have been seen by Stanley some years earlier, it is about as large as a mule, and the general colour of the pelt is blackish brown, with yellow legs striped



Okapi. Specimen of this Central African ruminant

By courtesy of Dr. Michel L'Hoest, of the Royal Zoological Society, Antwerp

horizontally with black. The neck is long in proportion to the body, and the head is giraffe-like, with large, upstanding ears. The male has two short pedicles of bone arising from the head, like the so-called horns of the giraffe. The okapi lives in the densest parts of the forest, and appears to go in small herds.

Okayama. Town of Japan, in Honshu. Situated 240 m. by rly. E.N.E. of Shimonoseki, on the route to Kobe, it stands on a wide alluvial plain in the lower course of the Asahi river, 7 m. from its mouth. Branch rlys. run to Uno, Tatai, and Tsuyama, the Uno line providing connexion with Shikoku. The castle is in ruins, the park, one of the most beautiful in the country, extends over 22 acres, and there are three Buddhist temples. Cotton and silk yarns, cotton goods, and rice have been produced. Pop. 166,144.

Okeechobee. Lake of Florida, U.S.A. The largest lake in the S. portion of the U.S.A., it borders the Everglades on the S., and is 40 m. long by 28 m. broad, its area being about 730 sq. m. Canals link it up with the Caloosahatchee river. Drainage was begun in 1881, and excess water is taken off to the Atlantic and the Gulf of Mexico.

Okehampton. Mun. bor. and market town of Devon, England. It is on the N.W. edge of Dartmoor, where the rivers East and West Okement meet. It is 25 m. by rly. from Exeter. The church of All Saints is modern, save for its noble tower, and there are the remains of a 15th century castle, in-

cluding parts of the chapel and banqueting hall. Okehampton was a bor. before 1886, and had then a castle. It sent two members to parliament until 1832. Outside the town are artillery ranges. Market day, Sat. Pop. 4,000.

O'Kelly, SEAN THOMAS (b. 1883). President of Eire. He was born in Dublin, and educated there at the Christian Brothers' schools. He became an assistant in the national library of Ireland, and a political journalist. In 1905 he assisted Arthur Griffith (*q.v.*) in founding the Sinn Féin movement, being secretary 1908-10. During the rising of Easter, 1916, he fought in the G.P.O., Dublin; he was imprisoned for this, but released after a year. In 1918 he was returned as Sinn Féin M.P. for College Green, and soon became a Dublin alderman. In the first (illegal) Dáil of 1919 he was chosen speaker, and he went to the Versailles conference, and later as Republican envoy to Rome. After the establishment of the Irish Free State in 1921 he retired into the political wilderness. When Eamon de Valera came to power in 1932, O'Kelly was made vice-president of the executive council, attending the League assembly at Geneva and the imperial economic conference at Ottawa. During 1932-39 he was minister for local government and public health, and in 1938 was made vice-premier. From 1939 he was an able minister of finance, until on June 25, 1945, he succeeded Douglas Hyde in the presidency.

Okhotsk, SEA OF. Gulf in the Pacific Ocean. It is formed by the peninsula of Kamchatka, the maritime region of Russia, and the islands of Sakhalin, Yezo, and Kurile. It is 1,535 m. long and 795 m. broad. On the N. shore is the small town of Okhotsk, in the region of Kamchatka.

Oki Islands. Archipelago of Japan, in the Japan Sea, W. of Honshu. The group is 44 m. from Sakai, on the mainland, with which a ferry service has been maintained from Saigo, the administrative centre for the islands. Area 135 sq. m.

Okinawa. Island in the Pacific Ocean. The largest island of the Ryukyu group, it is long, narrow, and irregular, with constricted waists of land and rugged peninsulas projecting E. and W. into the sea. Approximately 65 m. long from N. to S., it has a maximum width of 10 m., and an area of 485 sq. m. Some 325 m. from the Japanese mainland, it was a

prefecture of the Japanese empire until its capture by the U.S.A. in the Second Great War.

Okinawa had been developed by the Japanese as an air base, and fighter aircraft from the island offered serious opposition to U.S. bombers from the Marianas attacking industrial centres in Japan. Possession of Okinawa, with its good anchorages, was essential to the U.S.A. for the building up of forces for the final assault on the Japanese mainland. With the capture of Iwojima on March 26, 1945, Okinawa remained as the final stepping stone for the Allies to cross in the Pacific. Garrisoning the island with 60,000 troops, the Japanese had made elaborate preparations for the impending attack. Caves were turned into strongpoints, warships and aircraft assembled, while piloted flying bombs, suicide swimmers and boatmen, and mortars throwing 1,000-lb. projectiles were used for the first time.

Preceded by a devastating naval bombardment, the U.S. 10th army, commanded by Gen. Buckner and consisting of one corps of four army divisions and a corps of two marine divisions, went ashore near Yontan on Easter Sunday, April 1. A feint had deceived the Japanese as to the actual point of attack, and opposition was slight. By the end of the day the Americans had secured two airfields and advanced 3 m. On the 2nd their marines forced a corridor across the island and cut the defences in two. As the Americans had immense superiority in men and materials, resistance should have collapsed. But the American command made a serious tactical error in assuming that the Japanese would withdraw N. to take advantage of natural defences. Even when it became evident that they had concentrated in the S., Buckner committed his marine corps to an unnecessary mopping-up operation towards the N., while he wheeled the 24th army corps against the main enemy force. The wheel was carried out so slowly that the Japanese had sufficient time for improvement of the defences.

Thereafter the Americans continued to advance slowly and at heavy cost. The enemy had dug themselves into caves and along high ridges; the campaign became a series of hand-to-hand encounters over the most elaborate system of concealed fortifications yet encountered in the Pacific war. The Japanese navy and air force car-

ried out devastating attacks on the beaches and ships, while suicide pilots were brought into action against merchant vessels. Out of an invasion fleet of over 1,000 ships the U.S.A. lost approximately 100 sunk or seriously damaged. Buckner withdrew his marine corps from the N., but instead of landing it in the rear of the enemy, he placed it on the right flank, so that two army corps were crowded on a front of 8 m. Gradually, however, the weight of men and materials told in favour of the invaders, until the Japanese, fighting stubbornly to the end, were reduced to shattered remnants. With the break-through beyond Yonabara, the campaign became a mopping-up operation, and the American flag was hoisted over Okinawa on June 21, four days after the death of Buckner in action.

Estimated to last 40 days, the campaign on Okinawa had taken 82, and cost the U.S.A. 47,000 casualties, of whom 12,000 were killed and missing. Of the Japanese garrison of 60,000, only a few hundreds survived to be taken prisoner. American casualties shocked the people and drew adverse criticism, but military commentators justified the losses when balanced by the gains. Occupation of Okinawa enabled the U.S. air force to intensify its attacks on the Japanese mainland, while the loss of 4,000 aircraft over the island by the Japanese was a crippling blow. It remained a U.S. military base after the war.

In Oct., 1945, the island was struck by a typhoon which caused much material damage and heavy casualties among natives and U.S. troops.

David Le Roi
Oklahoma. State of U.S.A. One of the W. South Central States, it became a member of the Union in 1907. It lies between Texas and Kansas, E. of Arkansas. Part of the great basin of the Mississippi, it is a rolling plain varying in elevation between 1,000 and 2,500 ft., rising gradually from E. to W.; in the extreme N.W. it reaches 5,000 ft. The plains are almost treeless, and are scarred by cañons cut by the rivers; the rugged Ouachita (Washita) Mts. in the S. rise to 3,000 ft. Much of the state is arid, and the rivers, of which the chief are the Arkansas, Cimarron, Canadian, and Red, are frequently waterless during hot summers. To the N.W. lie the Great Salt Plains, a flat area 6 m. by 8 m., covered with a deposit of salt. Minerals include zinc, lead, and natural gas, but the leading

industry is oil production. Wheat-fields adjoin the oilfields, and other important crops include broom corn, cotton, maize, and oats. There are over 6,000 miles of rly.

Part of their territory was ceded by the Indians to the U.S.A. in 1866; from 1889 to 1903 various sections were laid open for white settlers. Oklahoma Territory was created as an administrative unit in 1890, and became a state in 1907. Nearly 20 p.c. of North American Indians live in the state. The capital is Oklahoma City (*v.s.*). The state sends two senators and eight representatives to congress. Pop. 2,250,000.

Oklahoma was the title of a musical show by R. Rodgers and O. Hammerstein, produced in New York in 1943, where it ran until 1948. It was also produced at Drury Lane in 1947.

Oklahoma. City of Oklahoma, U.S.A., the state capital and seat of Oklahoma co. It stands on the North Fork of the Canadian river, 31 m. S.S.W. of Guthrie, and is served by various rlys. Prominent buildings are the Capitol and Epworth university. There is a large trade in cattle, fruit, cereals, cotton, and oil. Pop. 204,424.

Olaf I Trygvesson (c. 960-1000). King of Norway, 995-1000. He had made expeditions to England, and even perhaps as far as Italy, when he returned to Norway, overcame Haakon Jarl, and secured his throne. Having become a Christian in England, he sought to make his people Christians also, founding a bishopric at Nidaros or Trondhjem, and building the first Norwegian churches. In 1000 he was attacked by the sons of Haakon Jarl, aided by the kings of Denmark and Sweden. Defeated at Svoldr, Olaf leaped into the sea and was drowned.

Olaf II (995-1030). King of Norway, 1015-30, and saint. He was a descendant of Harold Fair-Hair, and during his years of seafaring, in which he is said to have captured London on behalf of Ethelred the Unready, he was converted to Christianity in England. When he became ruler of Norway, which he made into one kingdom, he spread the faith with insistent severity. The pagan rulers, having banded together, called Canute of Denmark to their aid, and Olaf fled to Russia, 1028; but he returned and fell in battle at Stiklestad, July 29, 1030. He was canonised in 1164, and recognized as Norway's patron saint.

Öland. Island off the S.E. coast of Sweden. It is separated

from the mainland by Kalmar Sound, is 88 m. in length, and from 5 m. to 10 m. broad. Wooded in parts, it has good pasture ground and corn is grown near the coasts. Chalk, alum, and sandstone are exported, but the chief occupation is fishing. Borgholm on the W. coast is the chief town. Öland is rich in barrows, stone monuments, and other antiquities. Pop. 40,000.

Olav (b. 1903). Crown prince of Norway. Alexander Eduard Christian Frederik, called Olav, was born July 2, 1903, son of King Haakon VII and Queen Maud, and cousin of King George VI.

After leaving the Norwegian military academy he studied for two years at Balliol College, Oxford. On March 21, 1929, he married Princess Martha of Sweden. He accompanied his father and the Norwegian govt. to England in 1940. Commander-in-chief of Norwegian armed forces from 1944, Prince Olav was the first member of the royal family to return to Oslo after its liberation, May, 1945.

Old Age Pensions. This subject is fully treated under the heading Pensions.

Old Bailey. London thoroughfare. It runs S. from Newgate Street to Ludgate Hill, E.C. At its N.E. corner is the Central Criminal Court (*q.v.*), on land occupied by old Newgate (*q.v.*) prison, opposite which were set up the pillory, whipping post, and gallows. There was a prison here in the 12th century. A mansion of the Sidneys stood in the Old Bailey. Camden was born in this thoroughfare, William Hone and Jonathan Wild lived in Ship's Court, and Goldsmith in Green Arbour Court. The Old Roman Wall extended along the E. side. The name is derived from the old court of the city chamberlain, or from the *ballium* or outer space near Ludgate.

Oldbury. Mun. bor. and market town of Worcestershire, England. It is 5 m. W. of Birmingham, has a rly. station, and is on the Birmingham canal. Standing on the coalfield of the Black Country, it has steel works, iron foundries, and makes nails, tools, chemicals, etc. Pop. 53,000.

Oldcastle. SIR JOHN (d. 1417). English Lollard, known also as Lord Cobham. He is first men-



Prince Olav,
Crown Prince of
Norway

tioned as serving in the Welsh marches in 1401. In 1409 he married Lady Cobham, of Cooling,



Sir John Oldcastle,
English Lollard

and after several citations was arrested, tried, and sentenced to death. Escaping from the Tower, he was engaged in a Lollard conspiracy which nearly brought about a rebellion. Many leaders were arrested, but Oldcastle remained in hiding until 1417, when he was captured, taken to London, and hanged Dec. 14. Some have supposed him to be in part the original of Shakespeare's Falstaff. See Lollards.

Old Catholics. R.C. congregations, chiefly in Germany, Holland, and Switzerland, who have separated from the Church of Rome mainly on the question of papal infallibility. The movement originated in a conference at Munich in 1863 under the presidency of Dr. Dollinger, which was attended by about a hundred scholars and priests, with the purpose of uniting German R.C. divines in the work of promoting unity in religion and scientific thought.

Jesuit influence resulted, Dec., 1869, in the summoning of the Vatican council, which in the following June voted on the question of the infallibility of the pope when defining doctrine *ex cathedra*. The opposing bishops handed in a protest and left Rome before the session of July 18, which almost unanimously passed the decree.

Most of the opponents subsequently submitted under pressure; but Dollinger and Friedrich refused on the grounds that papal infallibility was contrary to Scripture and tradition, condemned by previous councils, based upon unauthentic authorities, and incompatible with civil order. As a result, both were deposed and excommunicated. Dollinger then called together an Old Catholic congress, which met at Munich in Sept., 1871, and issued a manifesto asserting adhesion to Catholic doctrine, and to the ancient constitution of the Church, repudiating papal infallibility, and declaring a desire to reform the Church and bring about reunion with the

Oriental and other episcopal churches. Old Catholic churches were opened in various towns in Germany and Switzerland.

A second congress at Cologne in Sept., 1872, was attended by the archbishop of Utrecht, bishops of the Anglican and American Churches, and a representative of the Russian Church, among about 500 other deputies. In 1873 Dr. Reinkens was consecrated the first bishop of the Old Catholics by the Jansenist bishop of Deventer, according to the Roman rite. See Dollinger; Infallibility; Jansenism; Papacy; Vatican Council.

Old Contemptibles. Nick-name given to men of the B.E.F. who crossed to France in 1914. See Contemptibles, Old.

Old Cocks' Race. Popular name for the Royal Automobile Club emancipation rally, an annual run from London to Brighton for veteran motor cars which commemorates the abolition of the 2 m.p.h. speed limit in 1896. Up to that date motor vehicles had to be preceded by a walker carrying a red flag. The event was suspended during the Second Great War, but revived in 1946. It takes place on a Sunday in Nov.

Old Curiosity Shop. THE. Charles Dickens's third novel, begun in the fourth issue of Master Humphrey's Clock (*q.v.*), April, 1840, and concluded in the number for Jan. 17, 1841. The illustrations were by George Cattermole and Phiz. The theme of the story is an old man's affection for his granddaughter for whose sake he becomes a hopeless gambler, and their wanderings together through the countryside. Little Nell, Daniel Quilp, Dick Swiveller, and Mrs. Jarley (*qq.v.*) are among the more famous creations of the novelist.

The novel is a remarkable example of *ad hoc* writing. The first intention of the author was to make it little more than a short story, first of a series describing the "personal adventures" of Master Humphrey, and the first instalment was printed under that heading, with the present title as a sub-heading. The first few chapters are told in the first person, and in a manner suggesting that the characters were completely unknown to the narrator; yet in the event it is revealed that this same Master Humphrey was closely related to the principal characters. Moreover, the curiosity shop itself plays no part in the story after the first few chapters.

Oldenburg. A former grand duchy, later free state, of Germany. In early times it was the homeland of Saxon tribes; its present name dates from 1059 and its dynasty has been one of the most widespread, giving kings to Denmark, dukes to Slesvig-Holstein, heirs to the Russian tsars, and to German emperors. The territory, with detached portions in Holstein and the S. Rhineland, embraces 2,480 sq. m.; most of the inhabitants are engaged in agriculture and cattle breeding, one quarter in industry. Before the Second Great War Oldenburg was famous for horses, cattle, and sheep. The coastline and rivers, including the Weser, lend themselves to the fishing industry, which in turn favours shipbuilding and fish and food preserving. Other occupations are engineering and textile work. There are several canals, and main rly. lines connect Bremen, Wilhelmshaven, and Osnabrück. Oldenburg became a duchy in 1777, and in 1815 a grand duchy. A free state from 1918, it was united with Bremen under a Nazi chief in 1933. It became part of British-occupied Germany, 1945, and was joined, 1946, with Hanover and Brunswick to form the *Land* of Lower Saxony. Pop. 585,000.

Oldenburg. A city of W. Germany. Formerly the capital of Oldenburg state, it is on the Hunte, 26 m. W. of Bremen, and is served by the Hunte-Ems canal and several rlys. The inner town contains many ancient, though restored buildings, *e.g.* the churches of S. Lambert (13th century), Holy Ghost (1468), S. Gertrude (1481). There are two town halls, one ancient, a palace in Renaissance style, 1607-15, several museums, two fine libraries, an art gallery, and an academy of engineering. During the Second Great War Oldenburg surrendered to units of the 1st Canadian army, May 3, 1945. S. Lambert's church and a library had suffered some damage. Pop. (1939), 66,951; (1949) 119,000

Oldfield, ANNE OR NANCE (1683-1730). An English actress.

Introduced to the stage by Farquhar and Vanbrugh, she first attracted attention at Drury Lane by her creation of two comedy rôles, Lady Betty Modish in Cibber's Careless Hus-



Anne Oldfield,
English actress

band, and Biddy Tipkin in Steele's *Tender Husband*. Renowned for beauty and talent, she played original parts in Addison's *Cato*, Rowe's *Jane Shore* and Lady Jane Grey, and Thomson's *Sophonisba*. She died Oct. 23, 1730. A comedy by Charles Reade, entitled *Nance Oldfield*, was produced at The Olympic, Feb. 24, 1883.

Oldfield, WILLIAM ALBERT (b. 1897). Australian cricketer, born at Sydney, Sept. 9, 1897. He first appeared in England with the Australian Imperial Forces team which toured in 1919. One of the finest wicket-keepers known in the game, he played regularly in test matches from 1924 to 1937. Once he gave away no byes in two English innings totalling 863. He was also a sound batsman late in the innings.

Oldham. A county borough in Lancashire, England. It stands on the Medlock, 6 m. N.E. of Manchester, has rly. stations and is served by a canal to Manchester docks and ship canal to Liverpool. The principal buildings are the town hall, art gallery and



Oldham arms

library, school of art, and technical college. Over 100 schools are administered by local authority, while there are two endowed independent grammar schools. The town is the centre of the cotton spinning industry, and makes textile machinery. Alexandra Park has long tree-lined walks and floral displays. There are eight suburban parks, bowling greens, tennis courts, and playing fields. Oldham made hats in the 18th century, but really developed from about 1790 with the introduction of cotton manufacture. It began to send two members to parliament in 1832, but was not made a corporate town until 1841. Market days, Mon. and Sat. Pop. est. 118,280.

Oldham, JOHN (1653-83). English poet. Born near Tetbury, Glos, Aug. 9, 1653, and educated at S. Edmund Hall, Oxford,

he was a schoolmaster and tutor, and was then befriended by the earl of Kingston, at whose place, Holme Pierrepont, Notts, he died of



John Oldham,
English poet
After Dobson

smallpox, Dec. 9, 1683. Oldham's reputation rests chiefly on his satires, especially *Satires upon the Jesuits*, 1681. These, though rugged in versification, are interesting as being the lineal predecessors of the satirical writings of Pope.

Old Jewry. A London street. Leading N. from Poultry to Gresham Street, E.C., and known in 1181 as *The Jewry*, and later as *Colechurch Lane* and *Sakfrelanelane*, it was once a Jewish quarter. In 1641 Sir Robert Clayton built a house here, which became the first home of the London Institution in 1806, and was taken down in 1863. The headquarters of the City of London police are at 26, Old



Oldham, Lancashire. Parish church of S. Peter, built in 1754

Valentine

Jewry. Half the W. side of the street was destroyed by German bombs in air raids during the Second Great War.

Old Kent Road. Thoroughfare of S. London. From the junction in Bermondsey of New Kent Road, Great Dover Street, and Tower Bridge Road, it runs S.W. 1 mile 6 furlongs to New Cross. Busy shopping districts alternate with residential areas along both sides, and it carries bus and tram routes. The main exit from London to Kent, it received severe damage from bombs and rockets in numerous air raids over south London during the Second Great War.

Old Man OR LAD'S LOVE. Popular name for southernwood (*Artemisia abrotanum*). See *Artemisia*; *Southernwood*.

Old Man Cactus (*Pilocereus senilis*). Succulent perennial herb of the family Cactaceae. A native of Mexico and Guatemala, it has a fluted cylindrical stem from 20 to 35 ft. high, the ridges bearing tufts of long white spines and long white hairs.

Old Man of Coniston. Mountain in the Furness dist. of Lancs, England. A familiar landmark of the Lake District, N.W. of Lake Coniston, it is 2,633 ft. high. Close to the Cumberland border, it forms the S. termination of the Cumbrian Hills.

Old Man of the Mountains. Name given to Hassan Ibn Sabbah (Sheikh-al-Jebal), founder of the secret Mahomedan sect known as the Assassins (*q.v.*).

Old Man of the Sea, THE. Character in *The Arabian Nights' Entertainments* (*q.v.*). In his fifth voyage Sindbad the Sailor, having been wrecked, assists a helpless old man by carrying him on his back. The old man twines his legs round Sindbad's neck and cannot be dislodged until he has been made thoroughly drunk.

Old Man's Beard. Rustic name for (1) traveller's joy or wild clematis (*Clematis vitalba*), a hedge plant; (2) a lichen, *Usnea barbata*, which attaches itself to the rowan tree.

Old Masters. Term applied to painters of a bygone age, and of established reputations; also used of the works produced by them. See *Art*; *Painting*.

Old Mortality. First of Scott's *Tales of My Landlord* ("arranged by Jedediah Cleishbotham, schoolmaster and parish-clerk of Gandercleugh"), and fourth of the *Waverley* novels. It was published with *The Black Dwarf* in Dec., 1816. The title was suggested by the hobby of Robert Paterson, a stone-cutter who wandered about Scotland for some forty years repairing the graves of the Covenanters, of whose fiery zeal the novel contains many vivid pictures together with graphic impressions of the battles of Drumclog and Bothwell Brig. The marriage of the hero, Henry Morton, with the heroine, Edith Belleniden, is brought about in one of the most convincing love-stories written by Scott.

Old Pretender. Name given to James Edward (*q.v.*), the son of James II and Mary of Modena, and claimant to the English throne in the early 18th century.

Old Red Sandstone. In geology, name given to a series of Palaeozoic rocks. They are named from their commonest constituent, red sandstone, but the series also contains grey, yellow, and green sandstones, and limestones and clay beds. The rocks of the group are of immense thickness, computed to be 20,000 ft. thick in Scotland, and are called Old to dis-

tinguish them from similar deposits of a later period of geological time. The series lies below the Carboniferous strata. The time of the formation of Old Sandstone rocks corresponds to that of the Devonian marine deposits. The series is found in Scotland, Wales, Ireland, Russia, where it alternates with Devonian deposits, Scandinavia, and N. America. Some Old Red Sandstone rocks contain no fossils; in others there are remarkable remains of fossil fishes and plants. *See* Devonian; Triassic.

Old Street. Street in the boroughs of Finsbury and Shoreditch, London. It runs from West to East, from Aldersgate Street to High Street, Shoreditch. Mainly commercial in character, its buildings include the Shoreditch town hall, a police court, and a station on the Northern line.

Old Style. *See* Calendar.

Old Testament. Name given to the collection of books which form the first part of the Bible and give an account of the history and religion of the Jewish people from the earliest times to the beginning of the Christian era. From one point of view, the O.T. is the literature of the Jewish nation; from another, it is the record of the Divine education of Israel for the reception of the Christian Revelation.

The books as they stand in the English Bible were written during the 600 years between 750 and 150 B.C., but many of them embody documents and excerpts which go back to a much earlier period. It was only gradually, however, that these books were collected together into what is known as the O.T. canon. The process of forming the canon took about 500 years. It commenced c. 440 B.C. and was not finally completed till the synod of Jamnia, in A.D. 90.

There are three well-defined stages in the growth of the O.T. (1) The earliest canon, which was formed c. 440 B.C., contained the Hexateuch including the book of Joshua. The explanation of the canonisation of the Pentateuch (without Joshua) is to be found in the fact that it contains the Law of God, on which the whole national life was centred. (2) About 200 years later the first edition of the O.T. was expanded by the addition of the prophetic writings, or the major part of them, among which were included the historical books known as Samuel and Kings. (3) During the last two centuries B.C. various other additions were made at different times, known as "the writings," including

Job, The Psalter, the Minor Prophets, Proverbs, Ecclesiastes, Chronicles, etc.

For some time several of these books were the subject of considerable controversy, e.g. Esther, Ecclesiastes, etc., but by the decision of the synod of Jamnia their inclusion in the canon was finally sanctioned. It was the destruction of Jerusalem and the loss of the Temple that finally gave the O.T. its supreme place in the religion of the Jewish race, and its adoption by the Christian Church secured it a position which it could not otherwise have gained. The process of enlarging the canon was continued in Alexandria, after it was completed in Palestine. The Alexandrians made a fourth addition, consisting of the books which are now placed in the Apocrypha (q.v.). This addition is recognized as canonical by R.C.s, but not by Protestants. *See* Bible; Criticism, Biblical; Hexateuch; and the articles on the various books.

Old Trafford. Suburb of Manchester. In the W. of the city proper, it has rly. stations. Here is the cricket ground of the Lancashire County club and near is Trafford Park (q.v.). *See* Manchester.

Old Vic. London playhouse in Waterloo Road, S.E.1. Opened in 1818 as the Coburg, it was a favourite place of entertainment for many years, Edmund Kean appearing here on several occasions. It later became the Royal Victoria Hall, popularly known as the "Old Vic," and by mid-Victorian times had declined into a "coffee-music-hall." Taken over in 1880 by Emma Cons (q.v.) its entertainments included concerts, and performances of popular plays of an "uplifting" kind. It was not until Emma Cons's niece Lilian Baylis (q.v.) assumed management and launched regular performances of Shakespearean drama from 1914 that the theatre became the recognized home of Shakespeare and of opera in English during the 1920s. Under her management many fine productions were given by producers who included Robert Atkins, Andrew Leigh, Harcourt Williams, Tyrone Guthrie, and Henry Cass, and by performers including Edith Evans, Athene Seyler, Charles Laughton, John Gielgud, Laurence Olivier, and Nicholas Hannen. After it became associated with Sadler's Wells in 1931, the organization was known as the Vic-Wells.

During the Second Great War the Old Vic company transferred

its headquarters to Burnley in 1940, its own theatre having been badly damaged by bombs. From Burnley a series of companies toured England during 1941-44. In the latter year drastic alterations were made in the Old Vic's policy. In conjunction with C.E.M.A. (later the Arts Council, q.v.) the organization, apart from continuing to maintain companies at the Theatre Royal, Bristol, and the Liverpool Playhouse, founded a permanent repertory company for performances of the classics, and during 1944-50 gave seasons at the New Theatre, London, the Old Vic having ceased to be a "people's theatre" in the broadest sense. The directors were John Burrell, Laurence Olivier, and Ralph Richardson. In 1946 an experimental theatre, a theatre school, and a theatre for children were inaugurated. The school provided theatrical training in all its branches, and became a nursery for Old Vic companies; the theatre for children became the "Young Vic" and its company began to give successful performances at London and provincial theatres during 1947-48.

Terence Dennis

Old Wives' Tale, THE. Novel by Arnold Bennett, published 1908, and generally considered the author's masterpiece and among the greatest works of English fiction. Some 250,000 words in length, it relates with a tenderness and sympathy unusual in the author as well as with all his faithful observation of minute objective detail, the life stories of two sisters from childhood to old age and death. The period is Victorian, and the scene is principally the Potteries (or Five Towns), with a long interlude in Paris which includes a description of life there during the siege of 1870. In the writing of the MS. Bennett adopted an exquisite style of calligraphy and made astonishingly few corrections; a complete facsimile was published in 1927, in a limited edition, 2 vols.

Oleaceae. The olive family of trees and shrubs. They are natives of the tropical and temperate regions, chiefly of the N. hemisphere. They have opposite leaves and four-part flowers, the calyx and corolla being sometimes absent. Representative genera are *Olea* (olive), *Fraxinus* (ash), *Jasminum* (jessamine), *Syringa* (lilac), and *Ligustrum* (privet).

Olean. City of New York, U.S.A., in Cattaraugus co. It stands at the junction of the Olean

Creek and the Allegheny river, 70 m. S.S.E. of Buffalo, and is served by the Erie and other rlys. Its buildings include the state armoury. Near by is Rock City, a group of uniform conglomerate rocks about 40 acres in area. Olean lies near the Pennsylvania oil and natural gas region, for the produce of which it provides storage, also making oil-well machinery. Other industries include tanneries and engineering works. Settled in 1804, Olean came to life as a lumber camp. A city charter was granted to it in 1893. Pop. 21,506.

Oleander (*Nerium oleander*). Evergreen shrub of the family Apocynaceae, native of the Mediterranean region. The erect stems grow to a height of 14 ft., and the narrow lance-shaped, leathery leaves are in whorls of three. The large, bright-red, funnel-shaped flowers are produced in clusters. The plant grows by riversides, and all parts of it are extremely poisonous, so that care is needed in handling it, pruning, etc.

Oleandra. Small genus of tropical ferns, natives of Ceylon, Natal, N. India, Malaya, Mascarenes, and the W. Indies. Their average height is 1 ft., and in temperate climates they thrive in hot-houses in a mixture of peat and loam. They should be planted in early spring, and receive plenty of water until the autumn. Oleandras



Oleandra. Rootstock with leaves, one turned to show spores

are propagated by spores from the back of the leaves of the ferns, sown in sandy soil at an average temperature of 75°.

Olearia. Genus of trees and shrubs belonging to the family Compositae, natives of New Zealand and parts of Australia. They are distinguished by the fact that



Olearia. Flower clusters and leaves of *O. haasti*

they yield a multitude of small white or blue daisy-like flowers. *Olearia haasti* is the most familiar of the many species.

Oleaster (*Elaeagnus*). Genus of shrubs of the family Elaeagnaceae, natives of Europe, Asia, and N. America. The shrubs range in height from 5 to 20 ft., and thrive in any ordinary soil, especially in S. or W. positions. They are increased by seeds sown in boxes of light soil in early spring, or by cuttings taken in autumn. The flowers are yellow, white, and occasionally green in colour.

Olefines. Hydrocarbons having the general formula C_nH_{2n} . The simplest representative of the series is ethylene, C_2H_4 , also known as olefiant gas. The lower members are gases at the ordinary temperature, and are followed by others which are liquids and solids. The distinction between them and the paraffins is that the olefines do not carry the maximum complement of hydrogen. They are therefore unsaturated and readily form addition compounds. See Hydrocarbon.

Oleic Acid. Acid occurring in most natural animal and vegetable oils and fats as the glyceride triolein. At ordinary temperatures it is an almost colourless oily liquid, which on exposure to light and air slowly becomes yellow and rancid. See Fatty Oils; Soap.

Olein. Commercial term applied to triolein, the glyceride of oleic acid, and to any liquid oil obtained from fats by pressure. It is also applied to impure oleic acid and to the sylvpholeates. Triolein occurs naturally in fats and oils, and can also be prepared by heating glycerine with oleic acid. It is a colourless oily liquid devoid of smell and taste. The liquid is made on

a large scale commercially for the manufacture of margarine (*q.v.*).

Olekma. River of Asiatic Russia. Rising in the Yablonoi Mts., in the E. Siberian region, it flows N. into Yakutsk A.S.S.R. and discharges itself near Olek-minsk into the Lena, after a course of 700 m. The neighbourhood abounds in furred animals, especially the sable, and gold is found.

Ole Luköie (Dan., Olaf the Eyeshutter). The Danish equivalent of the legendary character known to children as the Dustman. It is the title of one of the longer stories of Hans Andersen. Ole Luk-Oie was also the pen-name adopted by Sir Ernest Swinton (*q.v.*) for his works of fiction.



Oleaster. Spray of foliage and flowers

Olenek. River of Siberia, in Yakutsk A.S.S.R. After a tortuous course of 850 m. it discharges into the Arctic Ocean at Ust-Olenok.

Olenellus. Genus of trilobites belonging to the Lower Cambrian series of rocks. The animal had a flat, tapering body of 14 or more jointed segments, covered with a hard shell like a lobster. The head was comparatively large and broad, the tail long and slender. The body, head, and tail were usually provided with slender spines. *Olenus* is a similar fossil belonging to the Upper Cambrian series of rocks. These are the oldest fauna discovered by geologists. See Trilobites.

Oleograph (Lat. *oleum*, oil; Gr. *graphein*, to write). Name given to a kind of chromolithograph which imitates the effect of an oil painting. The colours used are generally darker than the corresponding ones for ordinary chromolithographs, and the resultant print is mounted on canvas and varnished, to imitate still more closely the oil-painting effect.

Oléron. Island off the W. coast of France, opposite the mouths of the Charente and Seudre. About 18 m. in length and 7 m. in extreme

breadth, with an area of 66 sq. m., it is included in the department of Charente-Inférieure. The chief places are St. Pierre, Château d'Oléron, and St. Trojan-les-Bains. Pop. 15,000. Oléron lay within the Gironde redoubt left behind by the German army in its retreat from France, 1944; French troops of the 1st army took it, May 1, 1945, the last point in the Gironde pocket to be cleared of the enemy.

Oléron gave its name to a code of maritime law. This was composed of judgements of the maritime court here, together with a collection of the accepted customs of the sea. It was introduced into England in the 12th century, England and Aquitaine being then under the same sovereign, and had influence on later developments of this branch of law.

Olfactory Nerve. Nerve of smell. It arises from the brain by three roots, uniting in the olfactory tract, which expands at its end into the olfactory bulb. From the bulb about 20 fine prolongations are given off, which pass through the cribiform plate of the ethmoid bone, and terminate in the olfactory mucous membrane in the upper part of the nose and nasal septum. *See* Nerve; Nose.

Olga (d. 968). Russian saint. She was the peasant wife of Igor, third grand duke of Russia, who first met her while hunting, and married her about 913. She became regent for her son, Sviatoslav, and is said to have been a capable ruler. After Igor's death, 946, she carried out a terrible vengeance on the Drevliens, who were guilty of his death. She went to Constantinople, where she was baptized and received the name of Helen. She was canonised by the Greek Church. Her feast day is July 11, O.S.

Olhão. Seaport of Portugal, in the prov. of Faro. It stands on the S. coast in a garden-like region, facing the Atlantic, 6 m. by rly. E. of Faro. It is noted for its sardine fisheries and canning houses, and engages in boat-building and the manufacture of cordage and sails, exporting figs, almonds, carobs, chestnut, cork, sumach, baskets, and tunny fish. Pop. 14,500.

Olibanum Tree (*Boswellia serrata*). Small evergreen tree of the family Burseraceae, native of the East Indies. Its leaves are divided into two rows of oval-oblong leaflets with saw-toothed edges. The small white flowers are borne in sprays. From the bark exudes a resinous gum, olibanum, believed to be the frankincense



Olibanum Tree. Foliage and fruit of the East Indian evergreen. Inset, flower sprays

of the ancients. It is astringent and stimulant, but is chiefly employed as incense. According to some authorities true frankincense is the product of *B. carteri*, an African species.

Olifants. Name of several rivers in S. Africa, of which the following are the chief: (1) River rising in the mountains N.E. of Cape Town and flowing about 150 m. N.W. to the Atlantic. It supplies irrigation water to Van Rhyn's Dorp. (2) River rising in the Kareeberg, Cape Province, and flowing N.W. into Great Bushmanland. (3) Tributary of the Gouritz river, Cape Province, flowing W. from the neighbourhood of Uniondale. (4) Tributary of the Limpopo, rising near Ermelo, S.E. Transvaal, and running N. and then E. to the Limpopo, which it enters in Mozambique.

Oligarchy (Greek *oligoi*, few; *archein*, to rule). Political term, meaning government by the few. It was used by Aristotle to describe a perverted form of aristocracy; it was government by the few in their own interests, whereas aristocracy was government by the best men in the public interest. Some of the city states of Greece had an oligarchical government, and so had Venice and other Italian republics. A well-known British example was the Whig oligarchy brought into existence by the events of 1688. *See* Government; Politics.

Oligocene System (Greek *oligon*, a little; *kainos*, new). In geology, a subdivision of the Tertiary period of time. It was the epoch which followed the Eocene and preceded the Miocene. Sediments of the Oligocene occur in Hants, the Isle of Wight, and at Bovey Tracy, Devon, where they contain lignite and pottery clays.

Oligocene beds are also found in the Paris Basin (*q.v.*), containing the gypsum deposits of Montmartre, gritstones, and lignite. There are rocks of the same age in Belgium and Germany. In the New World, the White River formation of Colorado is of this age, while Oligocene beds are known in the N.W. Territory of Canada. The beds are rich in fossil remains, including that of the three-toed horse, *Meshippus*, crocodiles, turtles, large land snails, insects, etc. *See* Eocene; Geology; Miocene.

Oligoclase (Gr. *oligon*, little; *klasis*, fracture). In geology, name given to one of the plagioclase (*q.v.*) or soda-lime feldspars. It is a sodium-calcium aluminium silicate, white with occasional grey, green, or red shades, and has a vitreous lustre. Varieties of oligoclase containing finely scattered grains of iron oxide are polished to make the gems known as sun stones. Oligoclase is found in subacid and intermediate igneous rocks (syenites, diorites, and their volcanic equivalents); accompanying orthoclase in many granites; and in metamorphic rocks, e.g. schists and gneisses.

Olinda. City of Brazil, in the state of Pernambuco. It stands on the coast, 4½ m. by tramway N. of Recife or Pernambuco. It has a cathedral, botanical gardens, colleges, law school, and a wireless telegraphy station. It was founded in 1535, and was the capital of the state for over 200 years, until superseded by Recife. Pop. 8,000.

Oliphant, LAURENCE (1691-1767). Scottish Jacobite. Of the family of Oliphant of Gask, prominent Perthshire royalists, he took part in the rising of 1715, and became laird of Gask on his father's death.



Laurence Oliphant, Scottish Jacobite

1732. He accompanied Charles Edward in the '45, and, with his son Laurence (1724-92), fought at Prestonpans, Falkirk, and Culloden. After the last battle father and son escaped abroad and the estate was forfeited. The elder returned to Scotland in 1763, his lands having meanwhile been purchased on his behalf from the crown, and died in Jan., 1767. *See* Nairne, Baroness.

Oliphant, LAURENCE (1820-88). British author. He was born at Cape Town, a son of the attorney-general of Cape Colony, educated in

Ceylon, and practised at the colonial bar. In 1853 he became private secretary to the earl of



Laurence Oliphant,
British author

and for a short time joined his religious community at Brocton, N.Y. Oliphant afterwards acted as correspondent for *The Times* in the Franco-Prussian War, and interested himself in a scheme for settling the Jews in Palestine. He died Dec. 23, 1888. Among his works are several travel books; *Piccadilly*, 1870, a brilliant satire; the mystical *Sympneumata*, 1885; and *Scientific Religion*, 1888.

Oliphant, MARCUS LAURENCE ELWIN (b. 1901). An Australian physicist, born at Adelaide, Oct. 8, 1901. He was educated at Adelaide high school and Trinity College, Cambridge. He became assistant director of research, Cavendish Laboratory, Cambridge, in 1935, and professor of physics at Birmingham university in 1937; then in 1948 was designated director of post-graduate research in physical sciences in the national university of Australia. He wrote on electricity in gases, surface properties, and nuclear physics, and was one of those who developed the atomic bomb.

Oliphant, MARGARET OLIPHANT (1828-97). British author. Born April 4, 1828, in Midlothian, she made her reputation with her first book, *Passages in the Life of Mrs. Margaret Maitland*, 1849, and thereafter produced more than 100 books. In 1859 her husband, Francis Wilson Oliphant, died, and her industry was the sole support of her own three children, and after 1864 of a widowed brother and his three children as well. Mrs. Oliphant died at Windsor, June 25, 1897. Among her best known novels are *Caleb Field*, 1851; *Lilliesleaf*, 1855; *Zaidee*, 1856; *Salem Chapel*, 1863; *The Minister's Wife*, 1869; *The Wizard's Son*, 1884; *Kirsteen*, 1890. She also wrote historical



M. O. Oliphant,
British author

works and popular biographies of Edward Irving, 1862, and S. Francois of Assisi, 1871.

Olivares, GASPAR DE GUZMAN, COUNT OF (1587-1645). Spanish statesman. Born at Rome, Jan. 6, 1587, he was educated at Rome and Salamanca. Securing a position at court, he became first minister of the crown and grand chamberlain to Philip IV, and for 24 years was the real ruler of Spain. While vigilant and hard-working, he brought the country to the verge of ruin by harsh taxation. He was outmanoeuvred by Richelieu, and the warfare to which he committed Spain brought no profit. Revolts having broken out in Portugal and Catalonia, Olivares was exiled in 1642 and died July 22, 1645.

Olive (*Olea europea*). Small evergreen tree of the family Oleaceae (q.v.), native of the Mediterranean region. It attains a height of about 20 ft., and has almost four-sided spiny branches and opposite oblong leaves. The small, white funnel-shaped fragrant flowers are produced in panicles, and the fruit is a small plum. This is the wild form. Pickled olives and olive oil are the produce of the variety *sativa*, which has been cultivated from time immemorial. It differs from the wild form in the branches being less square, without spines, the leaves more lance-shaped, and the fruit much larger and more fleshy. The oil is obtained from the fleshy part of the fruit by pressure, but much of the "olive oil" of commerce is more or less extensively adulterated with oils of cotton-seed, monkey-nut, sesame, and walnut. Pickled olives have had their natural bitterness reduced by soaking in a solution of lime and wood-ashes, after which they are bottled in salt and water variously flavoured.

The olive is cultivated occasionally in Great Britain as a greenhouse plant, and outdoors in a few favoured S. and W. localities. It is of easy culture in well-drained loam, and may be propagated by

means of cuttings of firm shoots or by seeds, treated as half-hardy subjects. Several species from the Cape of Good Hope (*O. capensis*, *O. laurifolia*, *O. verrucosa*) are found in cultivation.

Olive Branch Petition. Name given to a petition by the American colonists in 1775 pleading for the recognition of their constitutional claims by the British government. The petition was a last effort for a peaceful settlement, though hostilities had already begun when it was sent. The deputation was not allowed to present the petition. See *United States: History*.

Olive Oil. Oil obtained from the ripe fruit of *Olea europea*, the olive tree of S. Europe. Extensively used in cookery in S. Europe, it is chiefly employed in the N. as salad dressing. It is nutritious and mildly laxative, and finds uses as a constituent of ointments, liniments, cosmetics, and soaps.

Oliver (Lat., olive). Masculine Christian name. Feminines are Olive and the less familiar Olivia. Oliver was the name of one of the twelve peers of Charlemagne, and the phrase a Roland for an Oliver refers to the tremendous blows struck by these heroes when fighting in Spain. See *Roland*.

Oliver, EDNA MAY (1883-1942). American actress. Her real name was Nutter. Born at Boston, Mass., Jan. 12, 1883, she intended to become a singer, but owing to lack of means went on the stage, making her debut at Boston in 1911.

From her entry into films in 1929 she was a famous portrayer of eccentrics and dowagers, giving

memorable performances as Betsey Trotwood in *David Copperfield*, and as the Nurse in *Romeo and Juliet*. One of her last rôles was that of Catherine de Burgh in *Pride and Prejudice*, 1940. She died Nov. 9, 1942.

Oliver OR OLIVIER, ISAAC (c. 1556-1617). Anglo-Fr. miniature painter. After living in Rouen he settled in London, where he died Oct. 2, 1617, being buried in S.



Count of Olivares,
Spanish statesman



Olive. Foliage and flowers
of this South European tree



Edna May Oliver,
American actress

Anne's church, Blackfriars. Among his famous miniatures were those of Sir Philip Sidney and Henry, prince of Wales, both at Windsor Castle. He also executed some minutely finished portraits in oils. Isaac's son Peter (1594-1648) was another celebrated miniaturist.

Oliver, Victor (b. 1898). Austrian-born British comedian. Son of Baron von Samek, he was born July 8, 1898, and educated at Vienna university. Renouncing his title, he became a pianist, but in 1926 went to the U.S.A., toured in vaudeville, and first appeared on the New York stage in 1929. His London debut was at the Palladium in 1931, and he was in demand as a compère of revue and musical comedy, e.g. *Black and Blue*, 1939; *Get a Load of This*, 1941; *The Night and the Music*, 1945. In 1938 he won a radio popularity contest. He was married from 1936 to 1945 to Sarah, daughter of Winston Churchill.

Oliver Twist. Charles Dickens's first long continuous story. It appeared serially in Bentley's *Miscellany*, under his own editorship, Feb., 1837-March, 1839, with the sub-title *The Parish Boy's Progress*. The original book edition had illustrations by Cruikshank. Earlier instalments were written and published contemporaneously with the writing and publishing of the monthly parts of *The Pickwick Papers*. Branding the old workhouse system, it also pictures contemporary crime in its "miserable reality." Famous characters include Bumble, the pompous parish beadle and later workhouse master; Fagin, the old Jew who ran a gang of thieves; Bill Sikes, the brutal burglar and murderer; and the Artful Dodger, a diminutive pick-pocket. Oliver's "asking for more," which has become proverbial, refers to his appeal for a second helping of workhouse gruel. There have been several stage versions, Tree having been a memorable Fagin. A British film version was shown in 1948.

Olives, Mount OF, OR OLIVER. Mt. about 2,700 ft. high, situated E. of Jerusalem, from which it is separated by the valley of the Kidron. Its chief associations are with the life of Christ. On the brow

of the mountain He wept over Jerusalem; and from its summit He ascended into heaven. *See* Bethany.

Olivetans. Reformed branch of the Benedictine Order, known as the Congregation of Our Lady of Mount Olivet. It was founded in 1313 at Siena by Giovanni de' Tolomei, professor of philosophy in the university there, who became their first abbot-general in 1319. The Olivetans follow the rule of S. Benedict, but with somewhat stricter observances.

Olivier, Sydney Haldane OLIVIER, 1st BARON (1859-1943). British politician and reformer. Son of a clergyman, he was born April 16, 1859, and educated at Tonbridge and Corpus Christi, Oxford, joining the Colonial Service in 1882. He early became associated with the Fabian Society, of which he was secretary, 1886-1890. He held a number of appointments in the W. Indies; colonial secretary of Jamaica, 1899-1904, he returned there as governor in 1907, and was knighted in that year. He was permanent secretary of the board of agriculture 1913-17, then assistant comptroller and auditor of the exchequer, retiring in 1920. In 1924 he was secretary for India in the Labour government, being raised to the peerage. He was a member of the commission which investigated the sugar industry in the W. Indies and British Guiana, 1929-30. His publications included *White Capital and Coloured Labour*, 1906; *The Anatomy of African Misery*, 1927; *Jamaica: the Blessed Isle*, 1936, as well as a volume of light verse. He died Feb. 15, 1943.

Olivier, Sir Laurence Kere (b. 1907). British actor and producer. Born at Dorking, May 22, 1907, he was educated at St. Edward's School, Oxford, and

after studying with Elsie Fogerty, joined the Birmingham Repertory in 1926. He acted in London in *Bird in Hand*, 1928, and *Beau Geste*, 1929, in which year he first visited New York. He sprang to fame in 1935 by interchanging with John Gielgud the parts of Romeo and Mercutio at the New Theatre. In 1937 he joined the Old Vic company, giving virile performances as Hamlet, Henry V, and Macbeth. Co-director of the company, 1944-46, he played Richard III, Hotspur, Shallow, Astrov in *Uncle Vanya*, and Sergius in *Arms and the Man*, and achieved a triumph in *Oedipus Rex* and *The Critic* in the same programme. In 1945 he produced *The Skin of Our Teeth* and in 1949 *A Streetcar Named Desire*, in both of which his wife Vivien Leigh (q.v.) played the leading parts.

Olivier entered films in 1930, and took leads in *Wuthering Heights*, 1939; *Rebecca*, 1940; *Pride and Prejudice*, 1940; *Lady Hamilton*, 1941. He achieved international fame with a screen version of *Henry V*, 1944, of which he was director and star, as he was of a screen version of *Hamlet*, 1948. He was knighted in 1947.

Olivine. In mineralogy, a ferrous and magnesium orthosilicate. The name is given to the intermediate members of the olivine isomorphous series of minerals, which range from the magnesium-rich forsterite (q.v.) to the iron-rich fayalite (q.v.). All olivines are so called because of their olive-green colour. The mineral is a common constituent of igneous rocks, especially basalts, and is often found in meteoric stones; fayalite is occasionally found in acid igneous rocks. Cut and polished, it is used as a gem stone under the names of chrysolite and peridot. Olivine easily weathers into serpentine or hydrated magnesium silicate. *See* Chrysolite; Peridot; Serpentine.

Olla Podrida (Span., putrid pot). Name originally given to fragments of meat, vegetables, etc., collected in a pot, and later to the favourite Spanish dish of highly seasoned stew. The name alludes to the contents of the pot being cooked until the solid parts fall to pieces, and the French equivalent is *pot-pourri* (putrid pot), most



Sir Laurence Olivier, British actor



Mount of Olives, from the Kidron valley. In the foreground to the right is the Tomb of Absalom; above is the Russian Gethsemane Church

familiar in the sense of a vase of dried flower-petals. The term, like hotch-potch, is also applied to any miscellaneous collection, such as a literary or musical medley.

Ollerton. Market town of Nottinghamshire, England. It stands on the river Maun, 9 m. N.E. of Mansfield, and has a rly. station. It is a convenient centre for visitors to Sherwood Forest and the Dukeries (*q.v.*) The nearby village of New Ollerton was built to house the workers in the colliery of that name. Pop. 4,500.

Olmütz OR **OLOMOUC.** Town of Czechoslovakia, in Moravia. It stands on the right bank of the March, 41 m. N.E. of Brünn. The site of the fortifications is laid out with promenades, and there are a park and a kursaal. The cathedral of S. Wenceslaus is a 14th century Gothic structure, and S. Mauritius' Church, belonging to the 11th and 12th centuries, is noted for its organ. Other buildings include the archiepiscopal palace and the old town hall. Olmütz was unsuccessfully besieged by the Prussians in 1758. Pop. 60,030.

Olmütz, CONVENTION OF. Agreement signed at Olmütz, Nov. 29, 1850, by Austria and Prussia. It restored the Austrian, as against the Prussian, influence among the German states, shaken by the events of 1848-49, and left the difficulties in Hesse-Cassel and Schleswig-Holstein to be settled by all the German states. *See* Germany: History.

Olney. Market town of Buckinghamshire, England. It stands on the Ouse, 11 m. W. of Bedford

Olorgesallie. Early Stone Age site in Kenya. Situated near Lake Mogadi at the foot of Mt. Olorgesallie, it was first excavated in 1942 by Dr. L. Leakey. The site yielded one of the most complete Stone Age camps ever discovered; weapons, tools, and ornaments suggested greater advance in arts and crafts than previously had been suspected of that age. Bolas were found to indicate that Stone Age man hunted animals in much the same manner as do the gauchos of S. America.

Olsa. Tributary of the river Oder, rising in the Tatra Mts. In 1920 this river marked the general frontier between Poland and Czechoslovakia, except that at one or two places the Czechs occupied small areas on the E. bank.

Olštyn. Polish form of the name of the former E. Prussian town of Allenstein (*q.v.*); it became the capital of the new Polish prov. of Masuria (*q.v.*), 1945.

Olten. Town of Switzerland, in the canton of Solothurn. On the river Aar, 25 m. by rly. S.E. of Basel, it is an important rly. junction with large rly. engineering workshops. It is a tourist resort, and manufactures footwear. Pop. 15,287.

Olenitza. Town of Rumania. It stands on the left bank of the Danube, 35 m. S.E. of Bukarest, at the mouth of the Argesul. It is a river port and terminus of a branch rly. from the capital. Pop. 10,396.

Oltu. Rumanian name of the tributary of the Danube known also as the Aluta (*q.v.*).

Olympia. Small plain in Elis in the Peloponnese, Greece, in ancient times the scene of the Olympic games (*q.v.*). It was situated on the right bank of the Alpheus, where it joins the Cladeus. *See* illus. in next page.

Olympia. City of Washington, U.S.A., state capital, and co. seat of Thurston co. It stands on a

promontory at the S. extremity of Puget Sound, 70 m. by rly. S.W. of Seattle, and is served by the Northern Pacific rly. and by steamers. Chief buildings are the capitol and federal building. The port of Olympia (700 sq. m.) established in 1926 receives annually over 200 ships trading in timber products, building stone,

oysters, oil, and fruit. It was the first port of entry on Puget Sound, though a customs house there dates from 1851. The Deschutes river supplies water power for industry in Olympia. Pop. 13,254.

Olympia. London place of exhibition and entertainment. Situated in Hammersmith, it was opened in 1886 as the National Agricultural Hall. Later additions were the National Hall, 1922, and the Empire Hall, 1930. It is now the largest exhibition building in Great Britain, with floor space of 450,000 sq. ft. Among the outstanding early events at Olympia were: Paris Hippodrome, 1886; Barnum's Circus, 1889; the first international motor show, 1896; Buffalo Bill, 1902; Cochran's production of the Miracle, 1911; and the Carpentier-Gunboat Smith heavyweight championship fight, 1914. Annual shows there have included: Ideal Home Exhibition, British Industries Fair (part), Royal Tournament, Radiolympia, Shoe and Leather Fair, International Horse Show, and International Motor Show; also Bertram Mills's circus.

Olympia was requisitioned by the govt. in the First Great War as a German civilian internees' camp and then as an army clothing depot. During the Second Great War, in which the buildings suffered some bomb damage, it was in turn a civilian internment camp, an army vehicle depot, a Free French reception depot, an R.A.O.C. depot, a mess for H.Q. 21 army group, and a demobilisation centre.

Olympiad. The period of four years which elapsed between each celebration of the Olympic games. The Olympiad was the basis of a system of chronology used by the Greek historians, events being reckoned as so many olympiads from the first celebration.

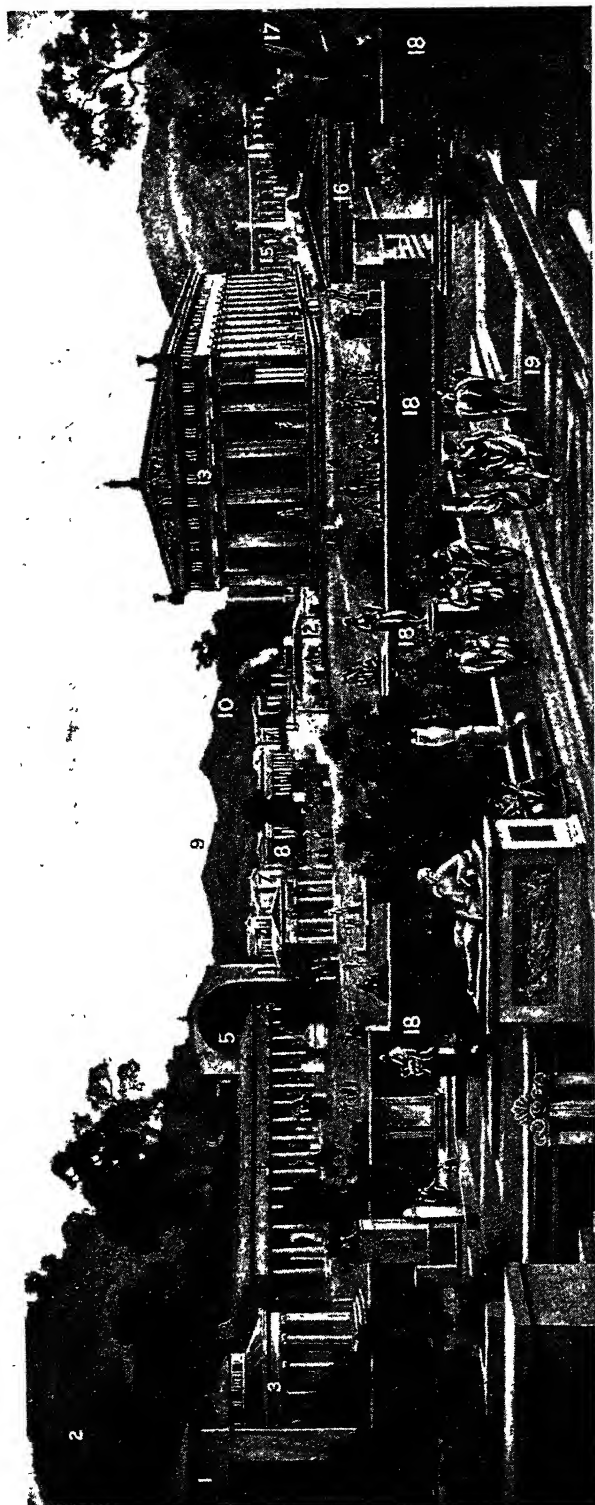
Olympic Games. In ancient Greece, a great athletic festival held at Olympia; also a modern international athletic festival. The ancient festival, which was in honour of Zeus, lasted five days, and took place every four years at the first full moon after the summer solstice. There was a record of victors from 776 B.C., but the games were regularly held long before that date. By 620 B.C. the festival had been thrown open to all free-born Greeks. It was abolished in A.D. 394. During the celebration a truce was observed by the various Greek peoples, and visitors flocked from all parts to the games.

The centre of the festival was the precinct consecrated to Zeus and



Olney, Buckinghamshire. Summer-house in the garden adjoining Cowper's house, where The Task and John Gilpin were written

and 55 m. by rly. from London. Its large and beautiful church of S. Peter and S. Paul is a fine example of the Decorated style. Olney is known for its associations with William Cowper and John Newton. Cowper's house in the market place is now a museum devoted to the two men. Market day, Thurs. Pop. 2,400.



Olympia. Reconstruction of the ancient Greek sanctuary where the great games were held. 1. Palaestra or wrestling ground. 2. Hill of Cronos. 3. Philippeum, erected by Philip of Macedon. 4. Heraeum, temple of Hera. 5. Hall of Herodes Atticus, a famous Sophist and public benefactor. 6. Pelopium, grave of Pelops. 7. Treasuries. 8. Metroum.

temple of Cybele, mother of the gods. 9. Arcadian mountains. 10. Site of the city of Phrixia. 11. Porch of Echo. 12. Great altar of Zeus. 13. Temple of Zeus. 14. Statues of Messenian boys. 15. Statue of Nike, goddess of victory. 16. Festival gate. 17. Sacred olive tree. 18. West Altis wall, enclosing sacred precincts. 19. Procession street.

known as the altis, an enclosure 750 ft. by 550 ft. Here stood a temple of Zeus containing the magnificent statue of the Olympian Zeus by Pheidias, the Heraeum or temple of Hera, and other temples, treasuries in which the Greek states deposited their offerings, and the *bouleuterion*, or council chamber, for the accommodation of the presidents of the games. The site has been excavated since 1875 by German archaeologists, and among the results was the discovery of the exquisite statue of Hermes by Praxiteles. Outside the altis stood the palaestra or wrestling ground, the stadium or racing track, with accommodation for about 40,000 spectators, the hippodrome where the chariot racing took place, and the gymnasium where the competitors did their final training.

In historical times the chief events were: foot races, long and short, chariot races, the *pancratium*, a combination of wrestling and boxing, and the *pentathlon*, a combination of long jumping, throwing the discus and the javelin, running, and wrestling. The prizes were wreaths of olive, but a successful competitor enjoyed free maintenance for life by his native city, or received some other tangible reward for the honour he had brought to it. (See Ladas; Ludi.)

MODERN FESTIVALS. Olympic games, with an international entry, were held in Athens, 1896; Paris, 1900; St. Louis, U.S.A., 1904; London, 1908; Stockholm, 1912. Owing to the First Great War, the sixth meeting, due in 1916 in Berlin, was postponed until 1920, when it took place at Stockholm. Thereafter the games were held in Paris, 1924; Amsterdam, 1928; Los Angeles, 1932; Berlin, 1936. Nazi Germany made lavish preparations for these last games, which became a display of propaganda for the regime and were marred by exhibitions of racial prejudice when several events were won by negroes. The meeting of 1940 was allotted first to Tokyo, then to Helsinki, but was not held because of the Second Great War; that of 1944 was likewise abandoned. The 14th meeting, held in the London area, July-Aug., 1948, was actually the 11th to take place, but it is a rule that cancellation of any meeting must not alter the numbered sequence. New events in 1948 included rifle shooting. A pentathlon of winter sports was held at St. Moritz, Switzerland, Jan. 30-Feb. 8, 1948, nearly 1,000

athletes from 28 nations competing. See Athletics; Marathon.

Olympic Line. Greek defensive position of the Second Great War. It extended from the Aegean Sea E. of Mt. Olympus to Veria and Edessa, thence N. to the Yugoslav frontier, having a total length of 100 m. The line was naturally strong against a frontal attack, but could easily be outflanked by an advance through a valley from Monastir, Yugoslavia. When the Germans attacked on April 10, 1941, the line was held by the N.Z., 6th Australian, and the 12th and 20th Greek divisions. By April 13 heavy enemy pressure, coupled with a threat from the flank, compelled the Allies to withdraw to the Thermopylae line. See Greece in Second Great War.

Olympus. Name of several mts., or mt. ranges, in ancient Greece. The best known forms the boundary between Macedonia and

thiacs, vainly urged his countrymen to send help. Excavations have been carried out by American archaeologists.

Om or **On** (Skt.). In Hindu religious literature, a solemn affirmation. The teacher begins and the pupil ends each lesson in the Veda with this word, which is equivalent to the Christian Amen (q.v.). Mystically, Om is regarded as symbolising the Hindu triad, Vishnu, Siva, and Brahma.

Omagh. Market town, urban dist., and county town of Tyrone, N. Ireland. It stands on the Strule, 34 m. S. of Londonderry, and has a rly. station. The chief buildings are the R.C. cathedral and the Protestant church. There are remains of an early castle rebuilt 1641. Linen is manufactured, and milling is another industry. The town, on its steep slope, is said to have grown around a religious house founded before 800.

In 1689 the force of James II damaged it. Market day, Sat. Population 5,741.

Omagua (flat-head). South American Indian tribe of Guarani stock, on the upper Ucayali river, Peru. Under Andean influence they formerly practised head-shrinking. Their fabled wealth led to several 16th century expeditions. For a century they have intermingled with other tribes. In Brazil they are called Umauas, perhaps their original name.

Omaha. Tribe of American Indians. They lived in what is now the state of Nebraska, and carried on a long and bitter war with the Sioux. The remnants of the tribe live on a reservation in Nebraska. The name means people of the upper stream.

Omaha. City of Nebraska, U.S.A., the co. seat of Douglas co. The largest commercial and industrial city of the state, it stands on the Missouri river, about 500 m. N.W. of St. Louis, and is served by eight major rly. systems, as well as the trans-Continental Union Pacific, of which it is the E. terminus. The city is built on a plateau, the commercial portion lying below the residential quarter, close to the river, which is here spanned by three bridges communicating with Council Bluffs. Among notable buildings are the city hall, the U.S. government building, two cathedrals, a public

library, a convention hall and auditorium, and several imposing business blocks. It is the seat of Omaha and Creighton universities, and has, among other educational establishments, two medical colleges.

Omaha has upwards of 1,000 acres of parks, and the military headquarters of the Department of the Missouri, which covers 80 acres. The Union Pacific rly. has extensive workshops, and here, also, is one of the best equipped plants in the world for the smelting of gold, silver, copper, lead, and zinc. Other industries include meat-packing and the manufacture of motor vehicles. Settled in 1854, Omaha was chartered as a city in 1857, and from its settlement down to 1867 was the state capital. South Omaha, until then an independent city, was incorporated with Omaha in 1915. The population is 223,844.

Omaha Beach. Operational code name given at the time of the Allied invasion of W. Europe, June, 1944, to the stretch of beach between Port-en-Bessin and the Vire river, in Calvados dept., France. Here the U.S. 5th corps landed on June 6. The troops met with the strongest opposition experienced on D-day, as the Germans, although in ignorance of the impending assault, had chosen that time and area to hold an anti-invasion exercise.

Oman. State of Arabia. It stretches for about 1,000 m. along the coast of S.E. Arabia, being bounded on the land side by the desert. Its area is about 82,000 sq. m., and the pop. about 500,000, chiefly Arabs, but some negroes. Much of the surface is mountainous, reaching 9,000 ft. in the Jebel Akhdar, but these are a coastal plain and an inland plateau. The chief products are dates and other fruit. Muscat is the capital, and Matrah the biggest town. In 1741 an Arab chief, having seized Muscat, called himself imam or ruler of Oman, and his descendants have since kept their authority. The area under their rule has varied considerably, having been especially extensive about 1800, when it included part of E. Africa. The government of British India, which had a resident at Muscat, found it necessary from time to time to interfere in the affairs of Oman, the integrity of which was last guaranteed by Great Britain in 1939.

Oman, GULF OF. N.W. extension of the Arabian Sea. It lies between Oman, S.E. Arabia, and Makran, Persia. It leads to the



Olympus. Highest peaks of the mountain famous in the history of ancient Greece, with their modern names. A. Throne of Zeus. B. Peak Venizelos. C. Cock's Comb. D. Virgin. E. Tarpeian Rock. F. Black Peak

Thessaly, the highest peak of which reaches an alt. of 9,800 ft. On its snow-capped summit the ancient Greeks placed the home of the gods, whence Olympus came to be used as a synonym for heaven, and later for the sky. Other mts. of the same name were in Lycia and Mysia in Asia Minor, in Cyprus, and in Laconia.

Olynthus. Ancient Greek city in Chalcidice, at the head of the Toronaic Gulf, a few miles from the coast, where Micyberna was its port. Under Perdiccas II it became a place of considerable importance. After the Peloponnesian war, in which it assisted Sparta against Athens, it was the head of a confederacy of Greek cities, and maintained its independence until besieged and captured in 348 B.C. by Philip of Macedonia, who sold its inhabitants into slavery. In its last extremity it appealed to Athens, and Demosthenes, in a series of speeches known as Olyn-

N.W. through the Strait of Ormuz to the Persian Gulf, and is over 200 m. wide at its entrance.

Oman, SIR CHARLES WILLIAM CHADWICK (1860-1946). British historian. Born in India, Jan. 12,



Sir C. W. Oman,
British historian
Russell

1860, and educated at Winchester and New College, Oxford, he became a fellow of All Souls, devoting himself largely to military history. In 1891

appeared his *Warwick, the King-maker*, and in 1898 his *History of the Art of War in the Middle Ages*. His *History of the Peninsular War*, 5 vols., 1902-14, cannot rival Napier in style and life, but it corrects some errors made by the earlier writer. Oman also wrote *Wellington's Army*, 1912, and popular *Histories of Greece, England, and Europe*. From 1905 he was Chichele professor of modern history at Oxford until his retirement in 1946. He was M.P. for Oxford university 1919-35, and knighted in 1920. He died June 23, 1946. His daughter, Carola Oman, was also known as a historian.

Omar (d. 644). Mahomedan caliph. One of those who were attracted to Mahomet, he became a leader of the new faith. In 634 he succeeded Abu Bekr as caliph, and held that position for ten years before being murdered by a slave. Omar carried on a warlike policy, bringing Palestine, Syria, and Egypt under his rule and crushing the Persians. He also ordered the internal affairs of the caliphate and was the first to bear the title Commander of the Faithful. The Mosque of Omar at Jerusalem, which he is said to have built to hold the rock from which Mahomet ascended to heaven, perpetuates his name. See Jerusalem.

Omar Khayyám, HAKIM (c. 1071-1123). Persian poet, astronomer, and mathematician. Born at Nishapur, Khorassan, he is said to have studied under the imam Mowaffak with Hassan-al-Sabbah, later founder of the secret sect of Assassins (q.v.), and Nizam-al-Mulk, who became vizier of Malik Shah. Khayyám means tent maker, which was perhaps the trade of his father. Omar helped to revise the Persian calendar, compiled astronomical tables, and wrote on mathematics. In Europe he was chiefly known as author of a work on algebra until attention

was drawn to his value as poet by the rendering into English, by Edward FitzGerald (q.v.), of part of his Rubáiyát (q.v.) or quatrains. These have been variously interpreted as praise of love and wine and of making the best of the present world because it is the human all-in-all, and as a Sufiite allegory in which wine is an emblem of God. As rendered by FitzGerald, the Rubáiyát is frankly an expression of hedonism touched with a certain melancholy that attunes with western as well as eastern pessimism.

Though much of it is mystical, there runs through it a strain of protest against bigotry which caused the poem to be judged heretical by some Mahomedans. Consult *Life*, J. K. M. Shirazi, 1905; *O. K. and His Age*, O. Rothheld, 1923.

Ombre. Card

game. Popular at the end of the 18th century, it is of Spanish origin, the name Ombre signifying the Man. It is played by three persons with a pack of 40 cards, the 8, 9, and 10 of each suit being thrown out. The peculiarity of the game is that cards have different values when forming the trump suit; and that certain black cards are trumps even when the trump suit is a red one. The game has a nomenclature of its own, Ace of spades (invariably the highest trump card) being *spadille*; 7 of hearts or diamonds, *manille*; Ace of clubs, *basto*; Ace of a red trump suit, *ponto*.

Nine cards are dealt to each player, three at a time, the remainder forming the stock or *talon*. The player on the dealer's right is the *ombre*, who plays against the combined efforts of the other two, as in three-handed solo. The *ombre* has the naming of the trump suit and also the privilege of changing any of his cards for those in the *talon*. If he is satisfied with his cards, and thinks he can make the majority of the tricks, he says "I play." The player on his right has the chance of calling over him and becoming the *ombre* if he decides to play from his original hand (termed *sans prendre*); or should he pass, the third can do so. If the *ombre* discards, the other players have the same privilege. Tricks are made as in a solo call. If the *ombre* makes all nine tricks

he scores a *vole*, and is paid a larger stake. There is a classic description of a hand at ombre in Pope's *Rape of the Lock*.

Omdurman. City of the Anglo-Egyptian Sudan. Situated on the left bank of the Nile, facing Khartum, and stretching for 7 m. along the river, it is the headquarters of the chief native traders of the Sudan, and an important native mart. As the resting place for pilgrims from the Western Sudan on their way to Mecca it was venerated by the Mahomedan tribes of North-Central Africa. During the regime



Omdurman, Sudan. House of the Khalifa Abdullah el Taashi

of the Mahdi (q.v.) this old dervish capital became the chief place in his empire and rallying place for his forces. The ruins of his tomb are in the centre of the city which has technical and other schools. Pop. 116,196.

Omdurman, BATTLE OF. Fought between the British and Egyptians and the forces of the Khalifa, Sept. 2, 1898. After his victory at the Atbara, Kitchener prepared for a further advance along the Nile, and in Aug., his force having been strengthened, he set out for Khartum. His own army, consisting of two British and four Egyptian brigades with attendant artillery and cavalry, marched along the W. bank of the river; on the E. marched a body of Arab irregulars, and in the Nile itself were the gun-boats. Altogether he had 26,000 men.

On Sept. 1 the gunboats were able to shell Omdurman, and that night Kitchener's force encamped in a zareba with the Nile behind them, about 4 m. from Omdurman. In the early morning the battle began with a dervish attack, easily repulsed. The British, anxious to seize Omdurman before the enemy could return to it, began to march forward, but danger threatened them from forces hidden in and behind the hills to right and left. One body was assailed by the 21st Lancers, in what has been called the last classic cavalry

charge in the history of warfare; the enemy held their ground and the Lancers had to cut their way through, losing heavily. Meanwhile the brigade under Hector Macdonald in the rear, was assailed from both sides, one attack being delivered by 15,000 picked men. For a moment the danger was real, but other brigades were able to assist and the enemy was beaten off. Omdurman was soon entered. The British and Egyptians lost about 500; the dervish loss was estimated at 10,000 in addition to 5,000 prisoners. Winston Churchill was in the battle as a subaltern taking part in the charge of the 21st Lancers and described it in *The River War*, 1899. See *Atbara*; *Egypt*; *Kitchener*.

Omelette. Dish made with eggs beaten up. A savoury omelette is seasoned with salt and pepper, and mixed with herbs, chopped kidneys, bacon, tomatoes, cheese, etc.; a sweet omelette is mixed with sugar, and flavoured with jam, maraschino, etc. A piece of butter is put in the pan, and when melted the mixture is added, stirred with a fork, cooked quickly, and served very hot. The word *omelette* is French, a corruption of *la lamelle*, from Lat. *lamella*, little plate.

Omen (Early Lat. *osmen*, probably from *audire*, to hear). Phenomenon observed as a means of divination (*q.v.*). The practice of observing omens is widespread, and was elaborated into systems by the Babylonians, Greeks, Etruscans, and Romans. Among omens observed by the Romans were lightning, the flight and feeding of birds, and the meeting with various animals. Omens were interpreted by the augurs and haruspices, and were especially looked for at sacrifices, *e.g.* by inspection of the entrails of the victim, and from chance utterances of the bystanders, who were enjoined to speak no ill-omened words. Words of ill-omen might be countered by a ready retort. See *Augur*; *Shamanism*.

Omentum. Fold of the peritoneum which connects the stomach with other internal organs.

Omeo. Agricultural and mining town in a dairy farming district on Livingstone Creek, Victoria, Australia. The town, 84 m. N. of the rly. at Bairnsdale, is a tourist centre for the grand mountain scenery of the Australian Alps, and is snowbound in winter. There are mineral and marble deposits, and mining interests are active. Settlement dates from 1835. Pop., town, 600; dist., 2,700.

Omniads, OMMAYADS, OR UMAYYADS. Dynasty of caliphs. Founded by Moawiya (c. 610–80), with the capital at Damascus, the dynasty lasted until 750, when it was replaced by that of the Abbassides (*q.v.*). The last of the Omniads, Abd-ur-Rahman I, made his way to Spain and founded another Omniad dynasty at Córdoba, which existed until 1031, when it ended with Hisham III.

Omnibus (Lat., for all). Public conveyance, carrying passengers for hire, over a regular route, taking them up or setting them down at fixed points. For fuller details and illus. see *Bus*, the form to which the word has been shortened in common speech. The term was also formerly used for a large box in a theatre which was let out on subscription to a group of patrons (*cf.* A Row in an Omnibus, in *The Ingoldsby Legends*).

In the 1920s the word came into use again to describe, by false analogy (false, because the intention was to suggest large size rather than universal appeal), a single volume containing several associated books. The vogue for omnibus volumes began with *The Forsyte Saga*, by Galsworthy, published 1922, which comprised within a single book the reprint

of three novels and two short stories. Similar groups of novels by Arnold Bennett, R. H. Mottram, and other novelists followed, as well as selections, or complete collections, of short stories by H. G. Wells, W. W. Jacobs, O. Henry, Galsworthy, etc., and of plays (Barrie, Galsworthy, etc.). Later many special kinds of omnibus books were issued, associating the

works of different authors by a unity of subject, *e.g.* detective fiction, books for children: really large-scale anthologies. The only novelty was the convenience of the single volume, which in effect enabled purchasers to acquire several books for the price of one. Yet even this was less of a novelty than might be thought as the Bible itself is an omnibus volume.

Omphacite. In petrology, name given to a pale green variety of pyroxene (*q.v.*). See *Eclogite*.

Omphalē. In Greek legend, wife of Tmolus, a Lydian king, whose kingdom she ruled after his death. When Hercules was condemned to a period of slavery as a punishment for the murder of Iphitus, Omphalē bought him, and the hero and the queen became deeply enamoured of each other.

Omsk. Town in the Omsk region of Siberia, R.S.F.S.R. Built on the right bank of the Irtysh at its confluence with the Om, it was the former capital of Akmo-linsk prov. and of the general government of the steppes. A fort was established here in 1716 to protect Russian settlers from Kirghiz raids. After the revolution of 1917, various governments rapidly succeeded one another; Koltchak declared himself dictator of Siberia at Omsk; and the town was the scene of fierce fighting during the civil war. An important junction on the Trans-Siberian rly., it has many educational institutions. Pop. 280,700.

Onager. Local breed of wild ass occurring on the steppes of W. and Central Asia. It differs from the kiang and the African wild asses in its smaller size, sandy-coloured hair, shorter legs, and narrower ears. It has a black stripe down the centre of the back,



Onager. Specimens of this Asiatic breed of wild ass
Gambier Bolton, F.Z.S.

and occasionally it is striped on the shoulders and legs. See *Ass*.

Onagraceae. Botanical family consisting chiefly of herbs, mostly natives of the temperate regions. They have regular flowers, made up of a two or four-lobed calyx and two or four petals. The fruits are seed-capsules or berries, the latter as a rule being edible. Well-known genera are fuchsia, evening primrose (*Oenothera*), and willow-herb (*Epilobium*). They are of little economic importance.

Oncidium. Extensive genus of epiphytes of the family Orchidaceae, natives of tropical America and the West Indies. With a few exceptions, they have pseudobulbs, from which the leaves proceed. As a rule the flowers are large and showy, borne in sprays or clustered in spikes, but a few have solitary long-stalked flowers.

Onega. River in the N. of European Russia. Rising in Lake Lacha, it flows N.E. and then N.W. into the Gulf of Onega. In length about 245 m., it runs parallel with Lake Onega, which lies about 200 m. W. The Gulf of Onega is an arm of the White Sea, with a length of 80 m. At the point where the river enters the gulf is the town of Onega.

Onega. Lake of N.W. Russia, the second largest in Europe. It is in the Leningrad region of R.S.F.S.R. and the Karelo-Finnish S.S.R., between the White Sea and Lake Ladoga, with which it communicates by means of the Svir. It is also connected by the Vytegra with the Mariinskaya canal-system, and the Onega (now Stalin) Canal has been constructed along its S. shore to avoid the difficulties of navigation. Its length N.-S. is 145 m. and average breadth 40 m. It contains numerous islands and an abundance of fish. In 1919 fighting took place around Lake Onega between the Allies and the Bolsheviks. Finnish forces reached the W. shores shortly after the declaration of war against Russia in 1941, but the sector was not strongly held, and rly. traffic to Murmansk was not seriously hindered. See Murmansk Expedition.

Onehunga. Town and port of North Island, New Zealand. On Manukau Harbour, it is the W. outlet for Auckland, 7 m. away. Woollen mills, shipping, and the export of timber and farm produce are its important industries. Pop. 13,886. *Pron.* O-nee-hunga.

Oneida. Lake of New York, U.S.A. It lies about 12 m. N. of Syracuse, and is 24 m. long and 5 m. broad. The Oneida river drains it to the Oswego river, a feeder of Lake Ontario. Sylvan Beach, on the E. side of the lake, is a favourite holiday resort. The town of Oneida stands on Oneida Creek, 26 m. E. of Syracuse, in Madison co. Chartered as a city in 1901, it specialises in furniture. Pop. 10,291. *Pron.* O-needa.

Oneida Community. Communistic society originally founded in Vermont, U.S.A., by John Humphrey Noyes, and restarted at

Oneida, Madison co., N.Y., in 1847. It has a religious basis, Noyes alleging N.T. authority for the doctrine that selflessness could be attained by holding all things in common. Even marriage was not a permanent relation in the community, but Noyes expressly disclaimed free love doctrines. Government was carried on by a system of mutual criticism. In deference to outside opinion the Oneida theory of marriage was given up in 1879, the community was dissolved, and in 1881 it was reorganized as a cooperative limited company.

O'Neill, EUGENE GLADSTONE (b. 1888). American dramatist. Son of an actor, he was born in New York, Oct. 16, 1888, and educated at Princeton and Harvard. He spent two years at sea, and worked as a journalist and actor before making a name with the one-act play *Thirst*, 1914. The Emperor Jones, 1921, and Anna Christie, 1922, brought him international fame. Then came mystical and semi-symbolical pieces, e.g. *All God's Chillun Got Wings*, 1924; *The Great God Brown*, 1926. A play of passion, *Desire Under the Elms*, 1924, was at first banned from public performance in the U.K. In *Strange Interlude*, 1928, and *Mourning Becomes Electra*, 1931—O'Neill's most ambitious pieces—the characters speak their thoughts. Each was filmed, as was Anna Christie. O'Neill's innovations in technique limited his appeal, but his work had a marked effect on the development of American drama, and in 1936 he received the Nobel prize for literature. A later play was *The Iceman Cometh*, 1946.

O'Neill, SHANE (c. 1530-67). Irish chieftain. Son of Con O'Neill, 1st earl of Tyrone (c. 1484-c. 1559), he was excluded from the succession by his father in favour of Matthew, his brother, possibly illegitimate, whom he murdered in 1558. He resisted the government of the earl of Sussex, but was recognized by Elizabeth as heir to Tyrone, visiting London in 1562. His remaining years were spent in fierce wars and harryings in the N., chiefly against the Scots settlers in Antrim and the O'Donnells. With a traitor's price on his head, he was murdered, June 2,

1567, by the MacDonnells, whom he defeated at Ballycastle in 1565.

Onesimus. Christian convert. He was a slave who ran away from Philemon at Colossae and made his way to Rome. There he met S. Paul, who converted him to Christianity and sent him back to his master with a letter, the Epistle to Philemon (*q.v.*), and also mentioned him when writing to the church at Colossae.

One-Step. American dance, popular also in England, where it was introduced about 1910, and in France. In the U.S.A. it was also known as the Castle Walk, after its inventor, Vernon Castle. It is virtually a running walk, performed to rag-time music. See Dancing, Ballroom.

One Thousand Guineas. Second of the five classic English horse-races. It is for three-year-old fillies, and is run annually at Newmarket over the Rowley mile on the Friday of the first spring meeting. The race was founded in 1814. See Horse-racing.

Ongar. Market town of Essex, England. In full Chipping Ongar, it stands on the Roding, 23 m. N.E. of London, with which it is connected by rly. and Green Line. It was scheduled as a "new town" after the Second Great War, but the project was abandoned because it would have raised insoluble problems of transport. Traces remain of a castle which stood here in the Middle Ages. Livingstone was trained for the ministry at Ongar, which has associations with Isaac Taylor. Market day, Sat. Pop. 2,481.

Onion (*Allium*). Hardy bulbous plant of the family Liliaceae. The plants are perennial, though



Onion. Two common varieties, 1. Long-keeping. 2. White Spanish
By courtesy of Sutton & Sons

onions and leeks for edible purposes are raised annually from seed. Native of Asia, *A. cepa*, the parent species of the garden onion, has been cultivated for centuries.

The onion requires a light, loamy soil, richly manured. The seed should be sown in rows about 12 ins. apart early in spring, covered only lightly, and the surface of the soil beaten down hard and firmly. As soon as the young plants show themselves, the top-soil should be

dressed with a dusting of soot and nitrate of soda, and the onions should be thinned out to about 6 ins. apart, the thinnings being useful for salads. At the end of the summer the ripened onions should be lifted from the ground and hung in a shed, or spread on a dry floor. Care must be taken not to allow damp to reach them. Successional sowings may be made at any time up till Aug. in order to provide for fresh winter crops.

Of the onions grown outside the British Isles, the Tripoli, Madeira, and Brittany varieties are the most popular in Britain. They are more delicate in flavour and less coarse of texture than the better known Spanish onion. The usual method of propagating onions is by seed from the top growth of bulbs which are left in the ground to ripen, and of which 10 lb. to the acre should result in a crop of 35-40 tons.

Onions, OLIVER (b. 1873). British writer. Born at Bradford, his real name being George Oliver, he became a journalist and black-and-white artist, contributing to many newspapers and magazines. His first book, *The Compleat Bachelor*, appeared in 1900, but it was the trilogy of novels of London, eventually collected in 1926 as *Whom God Hath Sundered*, which established his reputation as a master of atmosphere and a writer of impeccable prose. His ghost stories, collected into one volume in 1935, also secured a wide audience. Later works included *The Italian Chest*, 1939; *The Story of Ragged Robin*, 1945; and *Poor Man's Tapestry*, 1946 (awarded the James Tait Black memorial prize). Onions married Berta Ruck, a writer of popular light fiction.

Only Way, THE. A romantic drama founded by Freeman Wills and Frederick Langbridge on Dickens's *A Tale of Two Cities* (q.v.). Produced Feb. 16, 1899, at the Lyceum Theatre, London, it had a run of 167 continuous performances. The play laid the foundation of Sir John Martin-Harvey's success as a popular romantic actor. See *Martin-Harvey, Sir John*.

Onnes, HEIKE KAMRELINGH (1853-1926). Dutch physicist. Born at Groningen, Sept. 21, 1853, he was appointed in 1882 professor of experimental physics at Leyden. He died Feb. 21, 1926. Onnes, who received the Nobel prize for physics in 1913, is known particularly for his work on thermodynamics, his liquefaction of helium, 1908, and

his discovery of superconductivity (the virtual disappearance of electrical resistance in metals at very low temperatures).

Onomatopoeia (Gr. *onoma*, name; *poiein*, to make). Philological term for the formation of words in imitation of external sounds, whether uttered by living creatures or produced by inanimate objects. Instances are bang, bow-wow, buzz, cuckoo, frou-frou, mew, puff, quack, whir, in which the sound is an echo to the sense (hence the term *echoism*). Older etymologists regarded this method as one of the chief factors in word-formation in the earliest stages of a language, but it is now generally recognized that its influence can only have been limited. See *Philology*; *Phonetics*.

Onomichi. Town of Japan, in Honshu. It is a shipping centre on the coast of the Inland Sea, 191 m. by rly. from Shimonoseki, on the route to Kobe. The town lies along a narrow coast strip, backed by a high hill opposite the island of Mukai, which protects the harbour. There are 48 Buddhist temples, of which the finest is Senko-ji. Mattings, both plain and figured, and saké are the chief articles of trade. Steamers connect the town with Tadotsu, on Shikoku. Pop. 42,000.

Onslow, EARL OF. British title borne since 1801 by the family of Onslow. This goes back to Roger, lord of Ondeslowe, Shropshire. His descendant Richard Onslow (1528-71), was Speaker of the house of commons in Elizabeth's time. A later Richard (1601-64) was knighted, served in the Long and Protectorate parliaments and in the army, and sat in the house of lords called by Cromwell. His son, Sir Arthur (1621-88), became a baronet, and the latter's son, Sir Richard (1654-1717), was chosen Speaker, as was his nephew, Arthur (1691-1768), who filled that position during 1728-61. Sir Richard was made Baron Onslow in 1716, and the 4th baron, an official of the royal household, was made earl of Onslow in 1801. William, the 4th earl (1853-1911), was a Conservative politician who was governor-general of New Zealand, 1889-92. Richard, the 5th earl, was parliamentary secretary to the ministry of health 1921-23, under-secretary for war from 1924 to 1928, and paymaster-general from 1928 to 1931. He died June 9, 1945, and was succeeded by his son William Arthur Bampfylde Onslow (born June 11, 1913). The earl's seat is Clandon

Park, Guildford, and his eldest son is called Viscount Cranley.

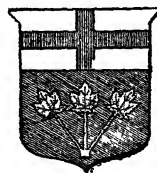
Onslow Bay. Broad bay on the S.E. coast of North Carolina, U.S.A. It extends W. from Cape Lookout, and flowing into it are the New, White Oak, Newport, and other rivers.

Ontake. Mountain peak in the Japanese Alps. The most frequented sacred mountain after Fujiyama, its alt. is 11,000 ft., and the summit is marked by a Shinto shrine dating from 1385. In summer crowds of pilgrims make the ascent, which, like that of Fuji, is divided into 10 stages. A sulphur crater and mountain tarns occur near the summit, which resembles that of Fuji in shape.

Ontario. Smallest and most easterly of the five Great Lakes of N. America. Its length is 193 m., width 53 m. at the broadest part, area 7,540 sq. m., maximum depth 774 ft., and average depth 412 ft. With a surface 246 ft. above sea level, it occupies a shallow depression in the earth's crust. It is fed by the Niagara river from Lake Erie, and is known at its N.E. outlet to the St. Lawrence as the Lake of a Thousand Isles. The chief feeders are the Genesee, Oswego, Black, and Trent rivers. An important section of the St. Lawrence and Great Lakes navigation, the lake is connected with Lake Erie by the Welland Canal, with the Ottawa river by the Rideau Canal, and with the New York State barge canal system by the Oswego Canal; shore ice interferes with navigation in the winter.

Called Lake St. Louis by Champlain, it was known to the French settlers in Canada as Lake Frontenac. See *Canada*; *Great Lakes*.

Ontario. Prov. of Canada. Its area is 412,582 sq. m., of which 49,300 are covered by water. The



Ontario arm.

prov. consists of two parts—the older, smaller, and more settled Lakes pen., which is something like a triangle between L. Huron, the Ottawa river, and Lakes Erie and Ontario; and the newer and larger part extending north to Hudson bay and west to Manitoba. The prov. capital is Toronto.

The climate is varied over this region extending 1,050 m. from N. to S. The Great Lakes exercise a moderating influence on the climate in the S. Mean annual temp. at Toronto is 45·8°. In the



N. the climate is colder and drier. The S. is gently rolling country, but N. of a line running from Georgian bay to the E. end of L. Ontario is the Laurentian plateau, or Precambrian shield, the surface of which is generally rugged with successions of rocky hills 100 to 200 ft. high. The area has been heavily glaciated, and contains many lakes and swift-flowing rivers and much mineral wealth.

The pop. (est. 1946, 4,107,000) is formed chiefly of people of British stock—72 p.c. in 1941. French constitute about 10 p.c. of the pop. The prov. has many attractive parks and lakes. The leading industries are manufacturing, agriculture, mining, and forestry, in that order. Ontario's manufacturing output is roughly equal to that of the rest of the dominion.

About 22.3 million acres are farmed, of which some 9 million acres are devoted to field crops. Mixed farming with a trend toward dairying is predominant, especially along the N. shore of Lakes Erie and Ontario. The prov. produces a greater value of minerals than any other part of Canada. Gold, nickel, and copper are the most important metals produced; iron, silver, lead, zinc,

and magnesium are also mined. Lumbering is very important in N. Ontario, where the manufacture of newsprint from pulpwood bulks large. Fishing is also important. The prov. is well served by rly., water, and air transport.

Electric power from Niagara and numerous other waterfalls is available. The hydro-electric power commission of Ontario generates most of the power. Appointed an independent, self-sustaining, cooperative organization 40 years ago by the prov. govt., the commission now owns and operates 47 hydro-electric power developments in different parts of the prov.

Ontario sends 82 members to the house of commons at Ottawa. Prov. govt., which is managed by

a cabinet responsible to a legislature (one chamber of 90 members), has control of education, hospitals, sanatoriums, highways, property and civil rights, natural resources, sale of alcoholic beverages, municipal institutions. A lieutenant-governor represents the crown.

Before 1782, when land in Ontario was given to loyalists from the U.S.A., the white pop. comprised only a few hunters. Until 1791 the country was administered

from Quebec, but in that year a separate prov. called Upper Canada (or sometimes Canada West) was formed. The monopoly of political power by a small group called the family compact, and the distribution of public lands, involving the clergy reserves, brought about a rebellion in 1837. As a result, by the Act of Union, 1841, Upper Canada was united to Lower Canada (Quebec), and responsible govt. was introduced in 1849. When the British N. American colonies of Upper and Lower Canada, Nova Scotia, and New Brunswick were united in the Dominion of Canada by the British North America Act of 1867, Upper Canada became the prov. of Ontario.

J. S. P. Armstrong, Agt. Gen.

Ontogeny. The development of the individual plant or animal. The term is applicable, in a structural sense, especially to organisms which being initiated as single cells grow by cell division and differentiation into the tissue masses that constitute the organs of the ultimate entity. Early cell divisions usually occur according to a pattern characteristic of the type, and are often spatially related to the position of structures in contact with the dividing cells or to the direction of an external stimulus impinging on them. In later stages of ontogeny, the products of one part of an organism may influence the manner of development of other parts. The course of ontogeny thus primarily depends on the hereditary endowment, and takes place in a coordinated manner, which may, however, be subject to the effect of environment.

Ontology (Gr. *logos*, theory; *ontos*, of that which is). The science of being as being, the investigation of its properties and relations, and of the ultimate principle of the physical and intellectual world. It is sometimes used as synonymous with metaphysics, of which, however, it is in reality a part. The ontological proof of the existence of God concludes, from the conception which we ourselves have of an infinitely perfect being, that such a being must necessarily exist. *See* Metaphysics.

Onus (Lat., burden). Legal term generally used in the phrase *onus probandi*, burden of proof. The rule is that he who affirms must prove; and in the course of a case the onus of proof often shifts from one party to another. Thus in an action for libel, with a defence denying publication and pleading that the libel is true, first the onus is on the plaintiff to prove that the defendant published the words complained of, and that they are defamatory of him, the plaintiff. Then the onus shifts to the defendant; and it is for him to prove that the words are true.

Onychia (Gr., *onyx*, finger-nail). Inflammation of the bed of the nail. It may be due to direct infection, or may develop in the course of diseases of the skin such as eczema. It is difficult to cure, but penicillin and the sulpha group are useful.

Onyx. General term applied to riband agates characterised by well-defined alternate rings of pure milk-white with bands of other colours. If the tint of the secondary rings is flesh colour, the agate is known as chalcedony-onyx; if red, carnelian-onyx; if green, sardonyx.

All these are utilised for intaglios (incised) and cameos (relief) carving for jewellery.

Onyx opal is a natural stone built up of alternate layers of precious and common opal. Onyx marble, from Mexico, and onyx alabaster, from Egypt, are handsome forms of stalactite marble, mostly calcite. They are sometimes used for ornamental purposes.

Oolite (Gr. *ōōn*, egg). In geology, (1) term used for a texture observed in some limestones, the rock being made up of small spherical or elliptical grains of calcium carbonate which look like fish roe, from which the term is derived. The texture results from precipitation of calcium carbonate around a small nucleus such as a sand grain, in shallow water where the grain is rolled back and forth by waves or current. Oolitic deposits are now being formed off the Bahamas and Florida; others are found on the shores of the Red Sea, where at low tide the oolitic grains are dried and drifted by the wind into dunes.

(2) Name given to the upper and middle divisions of the Jurassic system (upper and lower oolites) because the limestones present are characterised by oolitic texture. These rocks are valuable building stones. When they can be cut equally well in any direction they are termed freestones. Important beds have local names, Portland stone, Bath stone, etc. Iron ores of lower oolitic age showing similar texture are found in Northants. The two groups are highly fossiliferous, containing dinosaur remains in addition to ammonites and other shells. *See* Geology; Jurassic System; Rock. *Pron.* o-olite.

Oology (Gr. *ōōn*, egg). Branch of ornithology which deals with the eggs of birds. All birds' eggs are alike in the general arrangement of their contents and in the chalky nature of the shell; but differ widely in size, colour, and shape. The largest known egg is that of the extinct *Aepyornis* of Madagascar, which had a capacity equal to about two gallons, while the smallest are those of certain humming birds. *See* Bird; Egg colour plate; Embryology. *Pron.* o-ology.

Oosphere. The larger of two cells which unite during the sexual reproduction of many plants that form gametes of two sizes. An oosphere, like all gametes, is haploid, and differs essentially from the antherozoid or any other form of male gamete which fertilises it

in having a relatively large bulk of cytoplasm. It is usually non-motile, but often emits soluble material which attracts the male gamete chemotactically.

Oosterbeek. Village of the Netherlands. Lying 3 m. W. of Arnhem in Gelderland, it was the headquarters of the 1st airborne division in the battle for Arnhem (q.v.). On Sept. 17, 1946, there was unveiled a memorial erected by the Dutch people to British troops who fell in the battle. Near Oosterbeek is the cemetery in which most of them are buried.

Oosterhout. Town of the Netherlands, in the prov. of N. Brabant. It lies 5 m. N.E. of Breda, with which it has tramway connexion. Situated in flat agricultural country, it has a considerable trade in local produce. Industries are the manufacture of tiles and pottery, sugar-refining, and tanning. Pop. 15,107.

Ootacamund. Hill station and summer capital of Madras state, India. In Nilgiris dist., it is about 75 m. E. by N. of Calicut. It is the finest hill station in India, being over 7,000 ft. in alt., and having a temperate climate, with night frosts in Dec. and Jan. Around the station, where eucalyptus and wattle grow in profusion, are the open, rolling downs of the Nilgiri Hills. Here the Madras government sits during the hot season; the government offices on Stonehouse Hill date from 1821, and Government House from 1876. The station is reached by a branch rly. from Podanur. It was much used as a leave centre by British troops after service in Burma in the Second Great War. At Wellington, 7 m. S., was a British military convalescent centre. Pop. 29,850.

Ooze. Name given to deposits of mud on the ocean bed at great depths, composed mainly of the external skeletons of minute protozoa. The animals belong largely to the foraminifera. As globigerina is one of the commonest forms, globigerina ooze occurs frequently. These minute animals swarm near the surface as plankton, and as they die their skeletons sink. Globigerina ooze lies at depths above 2,000 fathoms, for calcareous skeletons will sink only so far before they dissolve. Below that depth siliceous skeletons of radiolara only will persist, some down to 5,000 fathoms. *See* Foraminifera; Plankton.

Opal. In mineralogy, an amorphous (colloidal) variety of hydrated silica. It contains a variable

quantity of water, up to 10 p.c., and varies in colour from dark to pale yellow, red, blue, or green, the lighter colours being more common. Sometimes it shows a rich play of colours (opalescence).

The mineral is most probably a dried-up gel and occurs in many ways; as deposits from siliceous waters at low temperatures in veins and thermal springs; from the weathering of different types of rock; forming skeletons of various marine organisms, diatoms, sponges, etc.; in most chalcedony and flint.

The precious opal has been from time immemorial one of the best-known gems. It is a semi-transparent, semi-translucent stone, bluish or yellowish white as a rule, and showing a wonderful play of all colours of the rainbow as the light strikes it at various angles. This play of colour is due to tiny fissures filled with air and water.

The chief producers of precious opal are New South Wales, S. Australia, Queensland, and Mexico. Opalescence is best brought out by giving the gem a rounded polished surface, and the loss of colour is due to the surface wearing, the stone being comparatively soft. The fire opal, a beautiful red stone, with yellow, or yellow and green reflections, is found in Mexico; as is the girasol, a bluish white opal, with red reflections. Hyalite (*q.v.*) is a glassy variety of the mineral without opalescence, and hydrophane is another variety of porous texture which becomes transparent on immersion in water. Menilite is a variety found in concretionary form, and is opaque grey. The common opal, which is not opalescent, occurs in a variety of colours from white to brown.

Opata. American Indian tribal division of Piman stock, in Sonora, Mexico. Embracing the Eudeva, Jova, and Teguma sub-tribes, they were more submissive than the Pima, and are now so thoroughly merged in the Spanish stock that in 1910 only 43 were separately enumerated. See Sonoran.

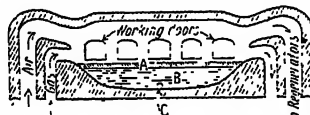
Opava. Czech name for the town also known as Troppau (*q.v.*).

Open Air Theatre. Enclosure in Regent's Park, London. The theatre, established by Sydney Carroll (*q.v.*), was opened June 5, 1933, with a performance of Twelfth Night. It forms a pleasing natural setting for out-of-doors drama, especially Shakespeare. Performances are given throughout the summer months (under cover in bad weather), and are enhanced at night by flood-lighting. The theatre was closed during the

Second Great War, and re-opened in 1945. See As You Like It illus.

Open City. In wartime, a city declared by the government of a belligerent country to contain no military installations, and therefore to be immune from bombardment. Paris was declared an open city in 1940, and Damascus in 1941. The Italians declared Rome an open city in 1943, but as it remained the seat of the government and an important rly. centre, it was bombed by American aircraft.

Open Hearth Furnace. Regenerative, metallurgical furnace used chiefly for the melting and refining of steel. In steel-making, the furnace charge, which consists of pig iron, steel scrap, and fluxes, is melted on a shallow or "open" hearth to produce a liquid bath of large surface area, which facilitates refining. The furnace is approx. rectangular in section. The hearth is built of steel plate lined (1) in the acid process with silica bricks, on to which fine silica sand is fritted to give the working surface; (2) in the basic process usually with magnesite bricks, a dolomite-tar mixture forming the working surface.



Open Hearth Furnace. Diagram showing the main construction features. The liquid bath contains A, molten slag, and B, molten metal. C is the tap hole

The walls and roof of the furnace are usually of silica brick, and in basic furnaces a neutral course of chrome magnesite separates the acid walls from the basic hearth. The front wall of the furnace contains the working doors, through which the charge is introduced and additions made to the liquid bath. The back wall is plain, except for the tap hole through which the bath is poured at the end of the steelmaking process; in the smaller fixed furnaces the tap hole runs from the lowest point in the hearth, through the back wall to a launder, and is kept stopped up during the processing. The capacity of an average sized furnace is 50 to 70 tons; furnaces of capacity up to 100 tons are usually fixed. Larger furnaces are of the tilting type, with the tap hole above the bath level except when tilted.

The end walls contain the port blocks, through which the gas (or oil) and air necessary to generate heat are introduced. The blocks at each end are identical, one serv-

ing for the separate introduction of gas and air, while the burned gases pass out of the furnace through the other; every 20 or 30 min. the direction of the gas-air travel through the furnace is reversed. In order to attain the temp. to melt and refine the charge, regeneration is necessary to pre-heat the gas and air. Below, and slightly to the sides of the furnace, are two pairs of regenerator chambers, one pair connected separately to each port block. The hot, burned gases leaving the furnace are led from the exit port block through slag pockets, where slag and dust particles are deposited, to one pair of regenerators. Most of the sensible heat of these gases is here absorbed by the refractory checker brickwork; when the direction of the gas-air travel is reversed, this heat is transferred to the gas and air. The gas and air pass from their independent regenerators to the entry port block. The air is introduced into the furnace above the lighter gas to effect good mixing, while both gas and air ports are inclined downwards to direct the flame on to the charge in the hearth.

Openshaw. District to the S.E. of Manchester, England. A busy manufacturing area, it makes rly. rolling stock, has iron foundries, dyeing and chemical works, cotton factories, and engineering establishments, and is traversed by the Manchester-Stockport Canal. Pop. 23,240. See Manchester.

Open Space. A space upon which the erection of buildings is prohibited or restricted by law. Open spaces are: (1) royal parks and Royal Botanic Gardens, Kew; (2) village greens, which may be used by the inhabitants of the locality for recreation or games; (3) open spaces as defined by Act of 1906; (4) public walks, pleasure grounds, or recreation grounds laid out by local authorities under *e.g.* Public Health Acts; (5) places held by the National Trust; (6) commons; (7) land to which the public may go for air and exercise under the Access to Mountains Act, 1939. The minister of Agriculture and Fisheries may apply this Act to land which is mountain, moor, heath, down, or cliff. Any person may have access between one hour before sunrise and one hour after sunset. It is forbidden to light a fire; draw a vehicle; take a dog not under control; disturb animals, eggs, or nests; hunt or fish; commit wilful damage; leave gates open; deposit rubbish; or hold political meetings.

OPERA THROUGH FOUR CENTURIES

Dyneley Hussey, author of *Great Composers of Opera*

This survey of the origin and development of a great musical art-form is supplemented by articles on all the famous composers of opera from Monteverde to Britten. See also Music; Orchestra; Singing, etc.

An opera may be defined as a drama of which the text is wholly (or mainly) set to music and sung to the accompaniment of an orchestra with appropriate action, scenery, and costumes.

Although its origins may be traced back through the tragedies and comedies of Athens to the primitive religious ritual of pre-history, opera, as we understand it, is a musical form of comparatively recent creation—a product of the Renaissance in Italy. Even as the Italian painters and sculptors were influenced by the newly discovered or hitherto neglected examples of Greek and Roman art, so the poets and musicians at the end of the 16th century were stimulated by the Revival of Learning to attempt the creation of a contemporary equivalent of Greek tragedy. Fortunately their knowledge was insufficient, and no more than the artists did they achieve a mere reproduction of the antique. They created a new form of dramatic entertainment, to which they gave the title of *dramma per musica* or (later) *opera in musica*, the emphasis being on the drama.

These experiments coincided—else they could hardly have succeeded—with a new development in the structure of the art of music itself. Polyphony, which had been brought to its finest flowering in the sacred music and madrigals of Lassus, Palestrina, Byrd, and Victoria, was giving ground to a homophonic style in which a solo melody was supported by a harmonic accompaniment. Dramatic action could hardly be carried on solely by means of the interwoven counterpoint of several voices, though it may be remarked that Vecchi's delightful madrigalian comedy *L'Amfiparnaso* (1594) provides a successful exception to the rule. Orazio Vecchi was one of a number of Italian musicians who at the turn of the 17th century were concerning themselves with the creation of a musical drama.

The first opera proper was Jacopo Peri's *Dafne* with a text by Rinuccini, produced in Florence in 1597. The real prototype of the lyric drama was, however, Peri's *Euridice*, the first of a long line of operas on the theme of Orpheus and Eurydice, which was performed

at the marriage festivities of Henry V of France and Maria de' Medici, 1600. The experiments of the French poets and musicians of the "Pléiade," who sought to adapt to the setting of French poetry what they imagined to be the principles of Greek music, had a considerable influence upon the new declamatory style developed by the Florentine composers, and especially by Claudio Monteverde, a Cremonese in the service of the duke of Mantua, who in 1607 produced the first masterpiece of opera, *Orfeo*. In *Orfeo* and its successors Monteverde solved the fundamental problems of presenting a dramatic story in music, and established a balance between action carried on by means of recitative and the summing-up of the dramatic situation in extended lyrical movements.

The new form of entertainment soon established itself in Italy and, in the generation after Monteverde, developed that sharp division of the music into recitative and elaborate aria, which was to be characteristic of Italian opera down to the time of Rossini. Although in the early 18th century opera tended to become little more than a concert in costume with characters, usually taken from classical history, giving expression to high-flown sentiments in conventionally tragic situations, the style of recitative (*recitativo secco* in which the voice is accompanied by a keyboard instrument with a violoncello to sustain the bass of the harmony) therein developed is unsurpassed as a vehicle for the carrying on of a swift dialogue in music, as may be heard in the Italian operas of Mozart (1756–91).

Commedia dell'Arte

In the meantime comic opera was also being developed alongside tragedy on the basis of the *Commedia dell'Arte*, whose farcical characters survive in a degraded form in the pantomime harlequinade and Punch-and-Judy show, and in a romanticised form in the ballet *Carnaval*, and in Leoncavallo's *I Pagliacci*. The chief contribution made to opera by the early comedies was the vocal ensemble. In the tragedies it was rare for the singers to be heard together even in a duet, while the chorus was mainly confined to the task of

pointing the moral in sententious couplets at the end of the drama, a function which it still fulfilled in the *opera seria* of the 18th century and, in a more flexible form, in Beethoven's *Fidelio* (1805). But in comedy the action could not very well be carried on without some kind of concerted ensemble, especially as the plot always hinged upon some misunderstanding between the characters. In *opera buffa*, therefore, the acts ended with concerted movements for all the characters—the *finale*, which was developed to such perfection by Mozart in his comedies, and which was transferred to tragic opera by the Italian composers of the 19th century.

France and England

The history of opera down to the 18th century is largely the history of Italian opera. But both France and England produced during the 17th their own characteristic styles of opera. In France the emphasis was upon the just setting of the text, which makes the operas of Lully (1632–87) sound rather stiff and dull to ears not attuned to the precise inflexions of the French language, while Louis XIV's passion for dancing secured to the ballet an important place in French opera, which survived into the 19th century when both Wagner and Verdi had to provide full-length ballets for their operas, *Tannhäuser* (1845) and *Otello*, when they were produced at the Opéra.

In England the suppression of the theatre under the Commonwealth oddly enough fostered the development of opera, since what might not be said was permitted to be sung. Nothing of lasting importance was, however, created until at the end of the century Henry Purcell produced his little masterpiece, *Dido and Aeneas* (1680), the only one of his works that fulfils his own definition of opera as "a story sung with proper action." The Fairy Queen, King Arthur, and the other "operas" of Purcell are spoken dramas with incidental music and elaborate masques at the end of each act.

In Germany still another characteristic form of opera was developed during the 18th century, the *Singspiel*, in which the action is carried on in spoken dialogue with songs and ensembles interspersed at appropriate moments. The earliest example familiar to us is *The Beggar's Opera* (1728). The comic operas of Arthur Sullivan (1842–1900) belong to the same category. The form was used by Mozart in his two German operas

Die Entführung aus dem Serail (II Seraglio, 1782) and Die Zauberflöte (1791), and was developed in France as *opéra comique*.

Even more important contributions made by Germany were the successive reforms of Gluck in the 18th century and of Wagner in the 19th. The Age of Reason could not tolerate the conventions of opera as understood by composers like Scarlatti and Handel and the great theatre-poet Metastasio. The stimulus to reform came especially from Paris, the initiative being taken by J. J. Rousseau, among others. The new theory of opera was proclaimed in the famous preface to Gluck's French version of *Alceste* (1776). In effect, Gluck's practice was a reversion to the principles of Monteverdi, which Gluck applied to the musical idiom of his own day. Similarly, if we cut away the vast quantity of philosophical verbiage in which he enveloped it, Wagner's operatic theory is fundamentally a revolt against the domination of opera by virtuoso singers and a return to the same principle of equilibrium between music and drama, though in practice his symphonic development of his musical material tended to concentrate the greater part of the interest in the orchestra.

Verdi and other Italians

While Wagner (1813-83) was constructing his vast dramas based upon old German legends in a musical style derived from the romantic operas of Weber and the symphonies of Beethoven and Schubert, his contemporary in Italy, Giuseppe Verdi (1813-1901), was slowly forging a style of his own. In this the voice was used as the chief vehicle of dramatic effect and emotional expression, as it had been used by Rossini (1792-1868), Donizetti (1797-1848), and Bellini (1801-35). But the orchestra was also gradually given a more highly developed musical rôle, until in the masterpieces of his old age, *Otello* and *Falstaff*, Verdi's music achieves a subtlety of colouring and expression unsurpassed in the history of opera.

At the end of the 19th century the development of orchestral technique and the reaction against romanticism produced the realistic or "verist" style of opera, represented in Italy by Mascagni's *Cavalleria Rusticana* (1890), Leoncavallo's *Pagliacci* (1892), and Puccini's *Tosca* (1900), and in France by such works as Charpentier's *Louise* (1900). In Ger-

many Richard Strauss carried the Wagnerian procedure to its logical conclusion in what are, in effect, one-act dramatic tone-poems (*Salome*, *Elektra*), before allowing his music to expand into a full-length operatic comedy, *Der Rosenkavalier* (1911).

Nationalism in Opera

The 19th century also saw the growth of nationalism in music, which resulted in the production of distinctive styles of opera upon local themes. In one sense, German opera from Weber to Humperdinck (including Wagner) is nationalist in inspiration. But the term is more obviously applicable to the works of the Russian composers Glinka (1803-57), Borodin (1834-87) Moussorgsky (1839-81) and Rimsky-Korsakov (1878-1908), and to the Czechs, Smetana (1824-84) and Dvorak (1841-1904), whose music is based upon Slavonic traditional melodies, and whose operas are based upon folk-stories or historical and patriotic legends. In the more sophisticated air of France, Bizet (1838-75) created a distinctively French type of opera, which differs from the cosmopolitan "grand" operas of Meyerbeer (1791-1864), Halévy (1799-1862), and Gounod (1818-93).

In England the revival stimulated by the music of Parry and Stanford during the last 20 years of the 19th century resulted in the production of numerous operas, among which those of Stanford (1852-1924) and Ethel Smyth (1858-1944) deserve mention, though they have so far failed to take a permanent place in the repertory. Later, characteristically English operas were created by Vaughan Williams, whose musical style is based upon folk-music and the polyphony of the Tudor period. In the 1940s a great success was scored both in England and abroad by the operas of Benjamin Britten, whose clever manipulation of an eclectic style is undeniably effective in the theatre.

The history of opera is largely the story of a ceaseless interplay between the interests of the singers and the musical and dramatic properties. In Italy, where music means first and foremost *singing*, the voice has tended to dominate opera, while German composers, with their tradition of symphonic music and their usually more serious attitude towards the arts, have tended to concentrate upon the orchestra and upon a careful presentation of the drama in music, sometimes to the detriment of its value as entertainment. In

France, too, the respect for literature has led composers to concentrate upon the just setting of their texts to a degree that makes their operas peculiarly difficult to perform in any other language than French. A perfect equilibrium in this conflict between the several elements that go to the making of opera has rarely been achieved, those who have come nearest to success being Monteverdi, Mozart in his Italian comedies, and Verdi in the operas of his mature years.

Bibliography. Music and Nationalism, a Study of English Opera, C. Forsyth, 1915; The Opera, R. A. Streatfield, 1925; Monteverdi, H. Prunieres, 1926; Mozart, D. Hussey, 1928; Foundations of English Opera, E. J. Dent, 1928; Verdi, F. Toye, 1931; Rossini, F. Toye, 1934; Handel, E. J. Dent, 1934; Gluck, A. Einstein, 1936; Opera, E. J. Dent, 1940; Mozart, A. Einstein, 1947; Life of Wagner, E. Newman, 4 vols., 1933-47; Mozart's Operas, E. J. Dent, 1947; Verdi, D. Hussey, 1947; Great Composers of Opera, D. Hussey, 1948.

Opéra Bouffe. French comic opera, to be distinguished from *opéra buffa*; the latter uses dialogue in recitative accompanied on the piano or harpsichord and approximates to *opéra comique*. *Opéra bouffe* is light in texture. It flourished in France during the 19th century, its chief exponent being Offenbach.



Opéra Comique. Main entrance of this Paris theatre, one of the national theatres of France

Opéra Comique. In the classification of opera, one in which the dialogue parts are spoken, not sung. The plot is generally brought to a happy conclusion, but this is not essential, an example of the contrary being Bizet's *Carmen*. The *opéra comique* should not be confused with the English comic opera, which corresponds to *opéra bouffe* (v.s.).

The Opéra Comique is one of the national theatres of France, now situated in the Place Boieldieu, Paris. Founded in 1714, it had a struggle for existence against the rivalry of the Opéra des Italiens and the Comédie Française, and was suppressed from 1718-21 and 1745-52. In 1801 it merged with the former, and occupied several buildings until the present one was opened, 1898.

A London theatre called the Opéra Comique was opened in the Strand Oct. 29, 1870, for the performance of French plays. As the early home of the Gilbert and Sullivan operas, it disappeared when Aldwych (*q.v.*) was constructed in 1901-05.

Opera Glasses. Type of binocular telescope of small magnification, designed for use in theatres. *See* Field-glasses.

Operation. Military term signifying the conduct of a major action against an enemy, as distinct from a raid or reconnaissance. In the 20th century operations have usually received code names, some of the most important of the Second Great War being: Operation Dynamo, the British evacuation from Dunkirk; Operation Overlord, the Allied invasion of Normandy; Operation Torch, the Allied landings in N. Africa; Operation Strangle, the R.A.F. offensive to cut the enemy supply system in Italy; and Operation Thursday, the dropping of troops behind the Japanese lines in Burma in 1944.

Ophelia (Gr., help). Character in Shakespeare's tragedy Hamlet. Beloved by Hamlet and commanded by her father, Polonius, to repel his advances, she goes mad after her father has been killed by Hamlet, and eventually drowns herself. *See* Hamlet.

Ophicleide (Gr. *ophis*, serpent; *kleis*, key). Brass wind instrument. It was the successor of the serpent, the bass member of the cornetti group. All these instruments had a cup-shaped mouthpiece and had lateral finger holes at distances to fit the stretch of the hand. Intonation was therefore liable to be imperfect. A new model, the ophicleide, was introduced, with keys to correct the imperfections. The ophicleide has been



Ophicleide, with keys to help fingering

succeeded in the orchestra and military band by the bass tuba or bombardon, but it served a useful purpose in the earlier part of the 19th century. It was used by Spontini in his opera Olympia, 1819, and Mendelssohn wrote for it in his Midsummer Night's Dream music, and in Elijah.

Ophidia (Gr. *ophis*, serpent). Scientific name for the sub-order of reptiles known as the snakes. They are grouped with the lizards in the order Squamata.

Ophioglossaceae. A small family of Pteridophyta. It has the leaves rolled lengthwise before expansion, and the spores contained in large two-valved capsules without an elastic ring. It includes the genera *Ophioglossum* (adder's tongue fern), *Botrychium* (moonwort fern), and *Helminthostachys*.

Ophir. Land famed in O.T. times for its gold, which was brought to Palestine by the ships of Solomon and Hiram, king of Tyre. Its locality has been the subject of much speculation, but S.E. Arabia is the most likely region.

Ophites or **NAASANI** (Gr. *ophis*, and Heb. *nahash*, serpent). Sect of serpent worshippers. They arose in Egypt in the 2nd century, existed until the 6th century, regarded the serpent that tempted Eve as the embodiment of wisdom, were antipathetic to Jews, and called themselves Gnostics, claiming that they alone understood the deep things of religion. The doctrines adopted by the various bodies of Ophites included elements of Egyptian and Assyrian symbolism, Indian mythology, Greek philosophy, and corrupt ideas of Christian history and doctrine. *See* Gnosticism.

Ophiuchus (Gr. *ophiuchos*, holding a serpent). In astronomy, equatorial constellation south of Hercules. It represented in ancient astronomy the serpent holder who is trampling on the scorpion and strangling the serpent.

Ophiuroidea (Gr. *ophis*, serpent; *oura*, tail). Class of brittle or sand stars. They are star-shaped echinoderms, having five arms, used for locomotion, extending from a flat central round disk which contains the mouth. Ophiuroidea have a small free-swimming larval stage, called a pluteus; fossil remains are found in the Silurian and later periods of geological time.

Ophrys. Genus of British, European, Asiatic, and African herbs of the family Orchidaceae. The genus includes such well-known species as the bee orchis,

fly orchis, and spider orchis. Their spurless flowers vary from pink to yellow and brown.

Ophthalmia. Inflammation of the conjunctiva or mucous membrane which covers the front of the eyeball, and is reflected on to the inner surface of the eyelids. *See* Conjunctivitis; Eye.

Ophthalmoscope. Instrument invented by Helmholtz, and later extensively modified. It consists of a small mirror with a circular hole in its centre and a rotating wheel in which various types of lenses can be fixed. The patient's eye is illuminated and observed through the small hole and one of the lenses. The condition of the blood-vessels at the back of the eye can be intimately examined, thus giving the physician an impression of the patient's blood condition. *See* Eye.

Opie, JOHN (1761-1807). British painter. A native of St. Agnes, near Truro, he obtained the patronage of Dr. Wolcot, known as Peter Pindar, accompanied him to London in 1780, and at once achieved celebrity as the "Cornish Wonder." He became A.R.A.



John Opie, British painter

in 1787, R.A. in 1788, and professor of painting in 1805; and died in London, April 9, 1807. Most immediately successful were his historical paintings, in which, though his technique was always deficient, he showed extraordinary freshness and vigour, but it is probable that his reputation will eventually rest on his simple scenes of Cornish life.

Opium (Gr. *opos*, juice). Juice obtained by cutting into the unripe capsules of the opium poppy (*Papaver somniferum*). This is solidified by evaporation, and comes into the market in the form of dark brown or black irregular masses. Crude opium contains a number of alkaloids, of which morphine, which may be present to the extent of 12 p.c., is the most important. Others are codeine, thebaine, and narcotine. In addition, opium contains neutral substances, organic acids, water, mucilage, resin, albumen, glucose, oils, and mineral salts. All the important alkaloids of opium have a narcotic action. Morphine from opium is generally used in British medicine as the hydrochloride. Opium and its deriva-

tives are classified legally as dangerous drugs.

Opium acts as an anodyne and narcotic entirely by virtue of the morphine it contains. It is often sprinkled over hot fomentations applied for the relief of pain, and opium liniment is similarly used. It acts either by local attack or by its influence when absorbed by the central nervous system. The principal uses of ointment of gall and opium are to relieve the pain of haemorrhoids and of anal fissure. Morphine is the most valuable drug for the relief of pain.

Morphine is also of great value for insomnia resulting from acute pain, but should not be given for chronic sleeplessness. Morphine also stops the peristaltic movements of the stomach and intestines. Hence it is of service in all inflammatory conditions of the abdomen, and it is by virtue of this property that opium tends to arrest diarrhoea. Opium may also be given with good effect in some cases of heart disease associated with pain.

OPIUM POISONING. Four grains of opium and two drachms of the tincture of opium have proved fatal, but recovery has occurred after much larger doses. The symptoms usually start within an hour. At first there is a mild degree of excitement, with flushing of the face and quickening of the pulse; soon this is followed by headache, giddiness, and somnolence, which gradually passes into stupor. In the early stages the patient can be roused, but later the coma is profound. The breathing is slow and stertorous, the lips livid, the skin cold and clammy, the pulse slow; the breathing becomes slower and slower, convulsions may occur towards the end, and ultimately the patient dies from asphyxia.

Treatment consists of washing out the stomach with a solution of potassium permanganate, about 10 grains to the pint. Coma is to be prevented, if possible. Once coma has supervened, artificial respiration is used.

Effects of Opium Habit

The opium habit is often acquired through the taking of opium to relieve pain. Hypodermic administration is the most frequent form. As the pleasurable excitement and feeling of well-being produced by the drug wear off depression follows, and the victim takes more opium to relieve this. When the habit has been definitely acquired the complexion of the sufferer becomes sallow, he

suffers from sleeplessness, sometimes nausea and vomiting, and emaciation gradually supervenes. He is irritable, and moral changes appear. Eventually there may be signs of peripheral neuritis and death may follow from exhaustion.

The effects of opium-smoking, due to morphine in a minor degree only, differ from those of opium-eating, which is practised in Asia Minor, Persia, and India.

THE OPIUM TRADE. The opium poppy, which is indigenous to W. Asia and S.E. Europe, yielded food and oil long before the 3rd century B.C., when sporadic extracts were made by the Greeks, and the potent sap from the capsules came into medicinal use before the Christian era. The spread of Islam carried the knowledge of the plant and its properties across Asia, and it was cultivated in China by the 8th century A.D. The Mogul emperors monopolised the Indian opium manufacture, and fostered an export trade. Asia Minor is still an important source of opium for medicinal uses. Good qualities have been produced in Egypt and in several Balkan states, and from early Islamic times Persia has been an active source of supply.

Tobacco reached China from Spanish America by 1620, and at first opium was mixed with pipe tobacco. Within a century the smoking of unmixed opium became so rife that in 1729 it was prohibited by Chinese imperial edict. After the ancient Indian monopoly passed to the East India company in 1757 the cultivation and trade grew apace. Successive Chinese edicts were persistently ignored, until in 1839 the seizure of British opium stocks at Canton led to the so-called Opium War, which ended in the cession of Hong Kong to Great Britain. Importation grew until in 1888 it reached 95,000 piculs of 133 lb. Local cultivation then spread swiftly over China and Manchuria.

In 1891 the British parliament adopted a resolution condemning the Indian cultivation and traffic. The poppy was being grown in Bengal, Agra, and Oudh, this "Bengal opium" being manufactured in government factories at Patna and Ghazipur. "Malwa opium" was produced in several princely states in Rajputana and central India. But high duties tended to discourage the traffic. In 1893-95 a royal commission sat, and recommended stricter supervision of the traffic. By 1906, when China was producing

376,000 piculs, her government promulgated an edict requiring the cultivation and use to cease throughout the empire within ten years. Great Britain undertook to reduce the export to China by annual tenths so long as local cultivation diminished *pari passu*. In 1908 the Hong Kong opium dens were closed.

International Control

International cooperation in the control and regulation of the opium trade began with the Shanghai conference, 1909, which cleared the way for the first international opium convention made at The Hague, 1912, and embodying general principles of international control. After the First Great War the League of Nations was given under its covenant the definite task of supervising and executing existing or future conventions and agreements regulating traffic in dangerous drugs.

The Geneva convention, 1925, set up stringent national and international control of the trade in narcotics, except opium for smoking, based on import and export licences, and an international accounting system, working through a permanent central opium board of eight independent experts, with certain powers of overriding national sovereignty. The limitation convention, 1931, limited manufacture of drugs directly, the quantity being determined by an international drug supervisory body. The convention for suppression of illicit traffic, 1936, provided severe penalties for traffickers—an innovation in international criminal law. Two agreements, made at Geneva, 1925, and Bangkok, 1931, concerned measures designed to reduce and eventually suppress opium smoking in the Far East.

By 1939 some 60 countries were parties to one or more international conventions for deciding the total world medicinal need of drugs, and the legitimate quantities to be manufactured in licensed factories. A clear line had been drawn between authorised and illegal traffic. All channels of distribution had been brought under supervision. The League had reduced the illicit trade to a tenth or less of what it was just after the First Great War.

The United Nations continued the work of the League through (i) its permanent central opium board, (ii) a supervisory body which examines and publishes the final estimates of drug requirements furnished to it by member

governments, and (iii) the commission of narcotic drugs, a policy-making body of representatives of 15 govts.

Opland. Inland fylke or co. of Norway. In the N. the Dovrefjeld and the Jotunfjeld rise in Snobetta and Goldhoppiger to 7,546 and 6,490 ft. respectively; in the S. the land is low near Lake Mjosen and Randsfjord. Between the heights a depression connects the Romsdal to the N.W. with the long valley of Gudbrandsdal, which leads to Lake Mjosen in the S.E. Here is the main road to the Atlantic coast, with a rly. for two-thirds of the way from Lillehammer at the head of Lake Mjosen, the chief town. Area, 9,608 sq. m. Pop. 153,201.

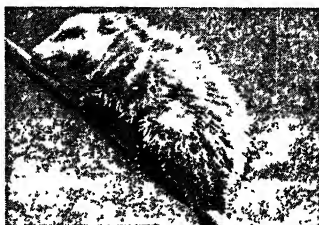
Oporto (Port., the port). Second largest city of Portugal and capital of a district. It stands on the N.



Oporto arms

bank of the Douro, $3\frac{1}{2}$ m. from the Atlantic and 209 m. by rly. N. of Lisbon. It is built in a succession of tiers on a hill slope, and lines the river for about 2 m. A striking feature is its two fine bridges; one carries the rly.; the other has two roadways; the upper one is 203 ft. above the water, with its arch, one of the largest in Europe, spanning 560 ft. Gaudily painted houses give the city an Oriental appearance. The cathedral was built on the site of a Visigothic citadel dating from the 12th century. Other buildings include an episcopal palace, many old churches, museums, opera house, bull ring, mint, and university. The Torre dos Clerigos (Tower of the Clergy) is 246 ft. high.

The centre of the port wine trade and a busy manufacturing town, Oporto rivals Lisbon, calling itself the capital of the North. Apart



Opossum. The Azaras opossum
W. S. Burridge

from the shipping, mostly carried on from its harbour of Leixões (*q.v.*), its chief industries are the spinning and weaving of cotton, wool, and silk, sugar refining, distilling, tanning, and the manufacture of pottery, hats, gloves, tobacco, paper, and articles of luxury. Wine barrels are made at the S. suburb of Villa Nova de Gaia, across the river, where are warehouses for the storage of wine, grain elevators, convents, and villas. Fishing is extensively carried on.

The Alani, who conquered the district in the 5th century, called their new town, on the N. bank of the Douro, Castrum Novum. The Visigoths took it about 540, the Moors captured in 716, and the Christians in 997, and finally in 1092. For a time it was the capital of the counts of Portucalia. Its commerce greatly increased after the earthquake at Lisbon in 1755. It was occupied by the French in 1808-09, was besieged by Dom Miguel, 1832-33, and in 1847 was held by revolutionaries. To quell a rising in 1927, government troops shelled the city for three days. It has always shown strong political activity. Pop. 262,309.

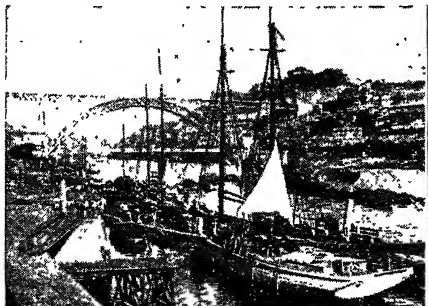
Opossum (*Didelphys*). Marsupial mammal. The family to which it belongs is found only in America, though fossil remains occur widely distributed throughout the world. Opossums are all of small size, nocturnal in habit,

carnivorous and insectivorous, and with few exceptions make their home in the trees. Most species have long prehensile tails, but some lack the pouch characteristic of marsupials. In Australia the name opossum is given to the phalanger (*q.v.*). See Marsupials.

Oppeln (Pol. Opole). Former capital of the former German prov. of Upper Silesia. It is situated on the Oder and the main Berlin-Budapest rly. Until severely damaged during the Second Great War it contained many impressive old buildings, such as the church of S. Adalbert (900), the church of S. Cross (1400), and a tower of the 14th century castle. Its industry, which was considerable, included the manufacture of cigars and cement, and the mining of lignite. From 1163 to 1532 it was the residence of the Silesian Piast dukes, and was joined to Prussia in 1742. Its 1939 pop. was 44,680. Captured Jan. 24, 1945, by Koniev's 1st Ukrainian army in an impetuous tank and infantry advance, Oppeln lay in the area placed under Polish administration by the Potsdam agreement (*q.v.*).

Oppenheim. Tn. of Rhineland-Palatinate, W. Germany, on the left bank of the Rhine, 20 m. S.S.E. of Mainz. The Gothic church of S. Catherine contains the tombs of the Dalberg family (*q.v.*). Oppenheim, which produces a well-known wine, was founded in 774 as an estate of Charlemagne. For four centuries it was a free city, but was taken by the Swedes in 1631, and by the French in 1689, 1792, and 1794. In 1816 it became a part of Hesse. After the Second Great War Oppenheim fell within the French zone of occupation. Pop. 4,078.

Oppenheim, EDWARD PHILIPS (1861-1946). British novelist. Born at Leicester, and educated at Wyggeston grammar school, he became widely known as a writer of popular fiction, his



Oporto, Portugal. Left, Ribeira quay and the iron bridge of Dom Luiz I, 203 ft. above the Douro, and spanning 560 ft. Right, Rue dos Clerigos with the Clerigos church

novels of mystery and sensation being marked by ingenuity of construction and high dramatic quality. His huge literary output includes *The Amazing Judgment*, 1897; *The Master Mummer*, 1905; *The Mischief Maker*, 1913; *The Double Traitor*, 1918; *The Great Impersonation*, 1920; *The Golden Beast*, 1926; *The Million Pound Deposit*, 1930; *Murder at Monte Carlo*, 1932; *Envoy Extraordinary*, 1937; *The Last Train Out*, 1941; *Mr. Mirakel*, 1942; and many others. His autobiography, *The Pool of Memory*, was published in 1941. He died Feb. 3, 1946.



E. Phillips Oppenheimer,
British novelist
Russell

Oppenheimer, JOHN ROBERT (b. 1904). American physicist. Born in New York, April 22, 1904, he was educated at Harvard, Cambridge, and Göttingen universities, and then became professor of physics at the university of California. During the Second Great War he became head of a special laboratory for the development and construction of the atomic bomb at Los Alamos, New Mexico. In 1945, Henry Stimson, U.S. secretary of war, declared that the atomic bomb was "largely due to Oppenheimer's genius."

Oppenheimer, SIR ERNEST (b. 1880). S. African financier. Born at Friedberg, Hesse, May 22, 1880, he worked in the London offices of a diamond firm, emigrating to Kimberley, S. Africa, in 1902. Mayor of Kimberley, 1912-15, and its M.P., 1924-38, he was knighted 1921. Chairman of many diamond companies, including De Beers and the Diamond Corporation, he financed the exploitation of Orange Free State gold from 1917 to 1947, and became one of the world's richest men.

Opposition. In British politics, the name given to the party that is out of power and that exists mainly for the purpose of criticising the party in power, and, if possible, supplanting it. An opposition is an essential part of parliamentary government, but in its modern sense the word was first used in 1826 by John C. Hobhouse, afterwards Lord Broughton. Gradually it came into general use, and the opposition became a regular part of the machinery of government, its leaders having recognized places

and precedence in both houses of parliament. The word used in this sense passed into all parliaments of the British Empire, and into some foreign legislatures. In the British house of commons the opposition sits on the benches to the Speaker's left, facing the government and its supporters on his right. The leader of "His Majesty's Opposition" is entitled to a salary of £2,000 per annum, of which £500 ranks as allowable expenses.

Opposition. In astronomy, the position of one heavenly body with respect to another when differing from it in longitude by 180°. When the earth, the sun, and another planet are in a straight line, the planet is in opposition when it is on the other side of the earth from the sun, and in conjunction (*q.v.*) when on the same side.

O.P. Riots. On the reopening of Covent Garden Theatre, London, by J. P. Kemble, in 1809, the theatre having been destroyed by fire, great indignation was aroused by the announcement that prices of admission were to be increased and private boxes installed at the expense of pit and gallery. The resultant rioting among the audience became known as the O.P. (old prices) riots. Disorder broke out on the opening night, Sept. 18, and continued with each performance until Dec. 16. Much damage was done, many persons were arrested, and the old prices were later restored.

Ops. In Roman mythology, wife of the god Saturn, and patroness of agriculture. The Romans identified her with the Greek Rhea (*q.v.*).

O.P. Side. In stage directions, this is the side opposite to the "prompt" side; usually the right of the stage from the actor's point of view.

Oposonin. Term used in bacteriology to explain the effect which normal human blood serum has upon the destruction of bacteria in the blood by leucocytes. Experiment has shown that there are substances in the blood serum which in some way or other so modify bacteria as to render them more easily attacked and devoured by the leucocytes. This change is known as the opsonic effect, and the substances in the serum which render the bacteria more easily destructible are called opsonins. By a highly technical bacteriological process an exact standard of the power of serum in this respect can be

arrived at, and the serum of one individual compared with another before and after treatment. This standard is known as the opsonic index. See Phagocytosis.

Optical Glass. Variety of glass used in the manufacture of lenses for optical instruments. The first essential characteristic of optical glass is that it must be homogeneous, and this has made it one of the most difficult glasses to produce to perfection. Guinand in the 18th century made the first attempt at homogeneous flint glass manufacture by constantly stirring the molten glass, and in 1824 the Royal Astronomical Society appointed a committee to consider the question of optical glass making.

The researches of Abbe and Schott at Jena, however, on the effect of various oxides on vitreous fluxes led to the invention of Jena optical glass, now in general use. The old varieties of optical glass consisted mainly of silicates, while modern glass contains many oxides, *e.g.* those of barium, zinc, aluminium, etc., silicates and boric anhydride, which enable lenses of remarkable purity and optical qualities to be made.

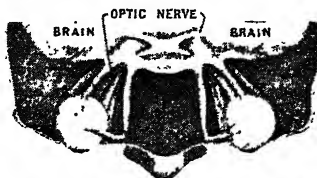
The glass has to go through a number of processes, *e.g.* moulding and annealing, and the high proportion of the finished glass which has to be rejected, on account of air bubbles, fractures, and other defects, makes the glass actually fit for optical purposes very expensive. Not more than one fifth of the total glass manufactured for optical purposes is actually used, as a rule. In the design of lens systems it is an obvious advantage to have available a wide range of glasses with different characteristics, *e.g.* the introduction of lead into flint glass has the effect of increasing the mean refractive index and giving a higher relative dispersion. See Glass.

Optician. One who makes or deals in optical glasses and instruments, or who examines the eyes and prescribes spectacles. There is in the U.K. no legal status for opticians, and the term is often used by those who sell spectacles. When applied to ophthalmic opticians it indicates one who, having passed the necessary examinations, is qualified by the Worshipful Company of Spectacle Makers, or by the British Optical Association. The Spectacle Makers Company holds a royal charter, and grants to all successful candidates.

a diploma and the right to append the initials F.S.M.C. The British Optical Association grants a certificate and the right to append the letters F.B.O.A. Other examining bodies in the U.K. are the Scottish Association of Opticians, the National Association of Opticians, and the Institute of Chemists and Opticians. In the U.S.A., and in many of the provinces of Canada and Australia, compulsory qualification and registration are required before a person can engage in the practice of sight testing. *See Eye; Sight.*

Optic Nerve. Nerve of sight. Arising from the lower part of the brain, it passes forwards into the orbit, where it enters the eyeball, and its fibres spread out over the inner surface of the retina. Inflammation of the optic nerve, or

optic neuritis, is a serious affection which most frequently arises in the course of tumours or other affections of the brain, or Bright's disease. Optic atrophy is a degeneration of the nerve fibres



Optic Nerve. Diagram showing position of optic nerve from above

which may follow optic neuritis, or may be due to tabes dorsalis (locomotor ataxia) and other nerve diseases. The condition eventually results in blindness. *See Eye; Nerve.*

OPTICS : SCIENCE OF LIGHT AND VISION

* R. W. B. Stephens, Ph.D., Imp Coll. of Science and Tech.

Among the articles which supplement the information given below are Dispersion; Lens; Light; Refraction; Relativity; Spectrum

The most familiar phenomena of vision are our inability to see objects round corners; the forms of shadows cast by opaque bodies; the formation of images of luminous objects by mirrors and the lenses of such instruments as reading glasses, telescopes, microscopes, cameras and projecting lanterns. A great deal of the knowledge we possess concerning these matters is very satisfactorily summarised in a few principles which are referred to as the laws of Geometrical Optics; these are statements which if assumed to be true will lead by the deductive methods of pure geometry to conclusions which are in very exact accord with experimental results. In this branch of optical science no hypothesis is made as to the nature of light beyond the simple assumption that it is an influence emitted from all visible bodies and capable of affecting the retinae of our eyes.

Umbra and Penumbra

Very little observation is required to convince us that this influence is propagated in straight lines. If one examines the shadow cast by an opaque body on a white screen in a room lit by one source of light only, an intensely black central part, called the umbra, is, in general, observed, around which is spread a less dark part, gradually fading into the complete illumination of the rest of the screen; this annular, partially illuminated portion of the shadow is called the penumbra.

Careful investigation will show that it is impossible to draw a straight line from any point on the

surface of the luminous source to any point in the umbra which does not cut through the opaque object, and that if we select any point in the penumbra it is possible to draw straight lines to points on a portion of the luminous source which do not meet the opaque object, the portion of the source becoming larger as the point chosen in the penumbra moves further out from the umbra, until we reach those parts of the screen in full view of the complete source. In particular, if the source is of very small dimensions, the penumbra is so small as to be imperceptible except at very close quarters, and the shadow consists almost entirely of an umbra.

Eclipses as Examples

The eclipses of the sun and moon are examples of shadows on an enormous scale, e.g. during total eclipses of the sun there is at any instant one comparatively small portion of the earth where the eclipse is actually total; this portion is the umbra of the shadow cast by the moon. Outside this lies a ring shaped portion, the penumbra, where the eclipse is only partial. Owing to the rotation of the earth, these portions move over the earth's surface, and thus we see the reason for the existence of the "track of totality." As a further illustration of rectilinear propagation we may instance the familiar "streaks" in front of a projecting lantern or within a fairly dark room into which sunlight is streaming through a window; but in this connexion it may be well to remove a common misconception. One is not "seeing

light" in these circumstances; such a phrase betokens a confusion of ideas; what we see is the dust and motes in the atmosphere which are being more than usually illuminated, and the cylindrical or conical form of these streaks arises from the rectilinear paths pursued by the elements of light emitted by the source. The fact of rectilinear propagation leads naturally to the use of the phrase, a beam of light, and still further to the conception that such beams are composed of extremely narrow beams which we idealize as straight lines and call rays.

Principles of Reflection

This concept of a ray is invaluable in the study of reflection and refraction of light. As a rule reflection from the surface of a body is quite irregular; the rays from a self-luminous source when they reach walls, floor, ground, etc. are scattered and redirected in all directions, otherwise such non-luminous, but illuminated, objects would not be visible from all points of view, as they actually are unless opaque bodies intervene. But provided the surface of a body has a certain amount of polish or smoothness, we begin to observe traces of regular reflection. The appearance of a well-polished table is an example of such partial regular reflections; and when the polish reaches that of the best glass or a brilliant metallic surface, practically all the reflected light is regularly reflected, and we get the phenomena of images.

In such cases each reflected ray makes the same angle as its incident part with the "normal," i.e. the line perpendicular to the reflecting surface at the point of incidence, and the incident ray, reflected ray and normal lie in one plane. Such a deviation from their original paths causes a small cone of rays, which could enter the pupil of an eye, originally emitted by a minute portion of a luminous or illuminated body (a "point-source"), to appear on its reception by an eye to be diverging from quite another point. The aggregate of such "point-images" forms the image of the body which is the aggregate of the original "point-sources." In certain cases of curved mirrors, a cone of rays originally diverging from a point-source may be made to converge by reflection and thus pass through a point only to diverge once more from what is called a "real" image which is actually in front of the mirror and not behind it. The reader may verify this for himself by looking into the hollow of a spoon with a lamp near at hand.

When light passes from one transparent medium to another, not only reflection occurs, but it is also observed that the portion of the light which enters the second medium is in general diverted from the original path. This occurrence is called refraction, and in the discussion of it the concept of a ray enables us to reduce our knowledge concerning refracted light to two simple geometrical statements: (1) the incident ray, the refracted ray, and the normal are in one plane; (2) the sine of the angle of incidence bears to the sine of the angle of refraction (*i.e.* the angle between the refracted ray and the normal) a ratio which is definite for two given media. Thus from air to glass this "index of refraction" is $3/2$; from glass to air $2/3$; air to water $4/3$; water to air $3/4$; water to glass $9/8$; glass to water $8/9$; and so on. Each pair of substances has its ratio, and its value gives the ratio of the velocities of light in the two media concerned. Images produced by lenses in reading-glasses, telescopes, cameras, etc., are due to the deviations of the rays of light emitted by a source, and their redirection into new paths which pass "really" or "virtually" through the points of the images which are actually seen by us; and experiment confirms the fact that all such appearances can be arrived at deductively by the methods of geometry, if we apply the two simple statements enunciated above to the given conditions in any case.

But geometrical optics is quite inadequate to explain a large number of observed results of experiment in optical science. The phenomena of interference, diffraction, polarisation, and even chromatic dispersion are quite beyond its scope. As a simple statement of interference we can say that it is possible for two specially adjusted sources of light to produce darkness along certain paths, this being compensated by reinforced illumination along others. In diffraction we deal with the existence of certain colour fringes well inside the geometrical shadow cast by the edge of an opaque object. By considering the effects of diffraction, attention was directed to the limitations on the performance of optical instruments, such information not being derivable from purely geometrical considerations.

When a ray of light passes through calcite it is divided into two rays which travel in general

with different velocities in the crystal. The velocity of the so-called ordinary ray is independent of direction, but the extraordinary ray is variable and has a maximum value in the direction of the optic axis (when it is equal to that of the ordinary ray), decreasing to a minimum in a perpendicular direction. Calcite is termed a negative crystal, to distinguish it from, say, quartz, which belongs to the positive class in which the extraordinary ray has the greater velocity in directions other than along the optic axis. The effect was explained by Young assuming that light waves were transverse, so that for each refracted ray there was a plane containing the ray which inhibited singular physical properties in any subsequent treatment of the ray. This phenomenon is known as double refraction or bi-refringence; and the rays are said to be "plane-polarised" in perpendicular planes. Thus if the ray is directed on to a piece of glass at a definite angle, and if the plane of polarisation of the ray is at right angles to the plane of incidence on the glass, no reflection takes place, the entire energy of the ray being transmitted into the glass.

In such phenomena, no adequate explanation is possible without the help of a definite theory as to the nature of light. In works on physical optics, appeal has to be made to mathematical analysis of a type much more complex than that involved in the comparatively simple geometry employed in geometrical optics.

With the advance of physics, the subject of optics has not lagged behind. Problems of illumination and colour are important in industry and everyday life; one need only cite the existence of the established profession of illumination engineer. In physiological optics considerable advance has been made, and in general the research worker is receiving more assistance from the improvement in such tools of research as optical glasses, light detecting devices, photographic plates, etc.

R. W. B. STEPHENS, Ph.D.

THE METEOROLOGICAL ASPECT. Light reaching the earth's surface from the sun, moon, or stars must pass through the earth's surrounding atmosphere, producing numerous optical phenomena. Refraction of the rays by the gases in the atmosphere results in the formation of mirages and is responsible for the twinkling of the stars. Rainbows and haloes are due to

reflection and refraction by water drops and ice crystals respectively; coronae are diffraction effects produced by water drops. The blue colour of the sky arises from the scattering of sunlight by individual molecules constituting the air, the short waves composing the blue and violet end of the spectrum being more scattered than the long yellow and red waves. Changing colours at sunrise and sunset are accounted for by the loss of the shorter wave-lengths which the white light suffers on passing through the layers of air then comparatively thick. Twilight is caused by the reflection of sunlight on to the earth's surface from the upper regions of the atmosphere, which, although the sun has set, are still illuminated directly.

Bibliography. Physical Optics, R. W. Wood, 1911; Theory of Light, T. Preston, 1912; Treatise on Light, R. A. Houston, 1938; Physics of the Air, W. J. Humphreys, 3rd ed. 1940; Experimental Spectroscopy, R. A. Sawyer, 1945; Practical Optics, B. K. Johnson, 1945; Applications of Interferometers, W. E. Williams, new ed. 1947.

Optime (Lat., excellently). Adverb taken from the phrase *optime meruit*, he has deserved very well, and used at the university of Cambridge as a name for candidates for honours who are placed in the second and third classes of the mathematical tripos. They are known as senior and junior optimes respectively. Pron. Optim-ee.

Optimism (Lat. *optimus*, best). The tendency to regard things in the most favourable light, opposed to pessimism. In philosophy, it is the doctrine that this world is the best of all possible worlds. There are two kinds of optimism, relative and absolute. The world may not be absolutely good, but at least the good in it is predominant. Leibnitz, in his *Theodicée* (justification of God), endeavours to prove that God, in His infinite intelligence, conceived an infinity of possible worlds, and called into being the one which He regarded, all things considered, as the best. But even this does not exclude the idea of infinite perfectibility. See Pessimism.

Option (Lat. *optare*, to choose). Literally, the act of choosing. In financial language an option is the right to buy or sell something, for which right money is paid. Thus a man pays for the right to buy certain shares at a certain price, or to buy a house or property of other kinds. If he does

not wish to exercise his option he loses the money paid down. An option to buy is termed a call, and an option to sell a put. *See* Stock Exchange.

Opuntia. Genus of succulent plants of the family Cactaceae. All are natives of America and some are familiarly known as prickly pear and Indian fig. The majority require treatment in green-houses, as some of them reach a height of 20 to 30 ft. Several species are quite hardy in the U.K. on well-drained soil. They flower during the summer months, with red, yellow, or purple blossoms, and thrive in a mixture of loam and limestone. Opuntias should be watered liberally during the summer months, but require no water from Nov. till Feb. They are propagated by cuttings of the stem planted in gritty soil in early spring.

Or (Fr.). In heraldry, gold, the principal metal. It is represented in drawings by small dots over the whole space, and in painting either by gilding or by yellow pigment. *See* Heraldry, colour plate.

Oracle (Lat. *orare*, to speak, pray). Originally, in Greece, the seat of worship of a deity where responses were given to inquirers, usually with reference to public events. The word was also used of the response itself. Such responses were accepted as representing the voice of the deity as expressed through a priest or priestess in a state of religious exaltation, or through some other medium, as at the oracle of Zeus at Olympia, where the divine will or knowledge was interpreted by inspection of the entrails of sacrificed animals.

The oracle was a characteristic feature of the religion of the ancient Greeks. Other well-known Greek oracles besides that at Olympia were the oracle of Zeus at Dodona (*q.v.*) in Epirus, which was considered the most ancient, and that of Apollo at Delphi (*q.v.*), the most famous of all. Its responses were interpreted by the priests in hexameter verse. Oracular responses in general were said to be characterised by ambiguity—a notable example being the response to Croesus (*q.v.*). Though the Delphic oracle was accused by the Athenians at any rate of partiality towards the Spartans, there is no doubt that on the whole the ancient oracles were on the side of

morality, both public and private. An oracle was always consulted before the foundation of a colony. The oracle of the hero Amphiaras, at Oropus in Attica, gave replies to inquirers in dreams. Oracles also existed among the ancient Babylonians and Egyptians. The Hebrew Urim and Thummim (*q.v.*) were a kind of oracle.

Oradea. Town of Rumania, in S. Bihar, close to the Hungarian border. Part of Hungary until 1918, it was known as Nagyvarad; earlier it was called by the German name Grosswardein. Lying E. by S. of Budapest, it is 160 m. distant by rly.

on the main line to Transylvania and the Predeal Pass across the Carpathians. It contains many educational institutions and two museums. Near by are the Felix and Bishop's baths, warm springs known to the Romans. Reputed to have been founded by S. Ladislas in 1080, Oradea was sacked by the Tartars in 1241. Pop. est. 92,943.

Oradour-sur-Glane. Village of Haute-Vienne dept., France, 15 m. N.E. of Rouchecrouart. During the Second Great War, on June 10, 1944, the entire village was destroyed by the Germans "in mistake" for another village as a reprisal against activities by the resistance movement. Nearly all the 750 inhabitants were shot or burned alive in the church. The ruins were left as a memorial of German brutality, but a new village was built within sight of the old. Oradour was awarded the Legion of Honour, 1949.

Oræfa Jökull. Volcanic mt. of Iceland, the culminating peak of

Vatna Jökull (*q.v.*), alt. 6,990 ft. It is the highest point on the island, and was first scaled in 1891 by F. W. Howell. Eruptions occurred in 1341, 1342, 1598, and 1727.

Orange, ALFRED RICHARD (1873–1934). British journalist. Born at Dacre, Yorks, Jan. 22, 1873, he became a teacher before adopting a journalistic career in 1906. Editor of *The New Age* before the First Great War, he made it an outstanding literary review, attracting brilliant controversialists to write for him. He later edited *The New English Weekly*. Orange published studies of Nietzsche, and *An Alphabet of Economics*, being an advocate of social credit. He died Nov. 6, 1934.

Orakzai. Pathan tribe of the Pakistan-Afghan frontier. Living S. of the Afridi, they differ in their less guttural N. Pushtu speech, and less robust physique, and are fewer. They occupy the lower valleys, where they raise winter crops.

Oran. Department of Algeria. Bordering upon Morocco, it was conquered by France during 1835–47. It is divided into the five civil arrondissements of Oran, Mascara, Mostaganem, Sidi-bel-Abbès, and Tlemcen, and three military divisions. Its area is 23,500 sq. m. Pop. 1,623,356. *See* Africa.

Oran. Seaport of Algeria. On the Gulf of Oran, is 260 m. by rly. W.S.W. of Algiers, and capital of the dept. of Oran. The city, which has an excellent harbour, now ranks as the second city of Algeria, exporting wine, cattle, grain, and minerals. The modern parts are well planned and stoutly built in the fashion of a French city; notable buildings are the Château-Neuf (1563), the museum and library, R.C. cathedral, and the Grand Mosque. Pop. 194,746.

Oran was captured by the Spaniards in 1509, abandoned by



Opuntia. Stem and flower of the Indian fig



Oran, Algeria. View of the harbour and fort of this important city of N. Africa, from the Promenade de l'Etang

them in 1792, and occupied by the French in 1831. After the Franco-German armistice of 1940, when it appeared likely that French warships would be taken over by Germany or Italy, a British battle squadron arrived at Oran on July 3. The French commander refused the British terms, and a short action ensued in which the battleships Dunkerque and Strasbourg were damaged, an older battleship was sunk, and another badly damaged. On Nov. 8, 1942, U.S. troops landed in the vicinity of Oran, occupying the town and naval base on Nov. 10.

Orange (Arab. *nāranj*). Fruit of *Citrus aurantium* and its varieties, evergreen trees of the family Rutaceae, natives of Asia. Whether the several varieties of orange



Orange. Spray of foliage, flower, and fruit. Inset, fruit in section

are the descendants of a single wild species or of several species is an open question, oranges having been cultivated for so many centuries that there has been time for many varieties to have arisen. The date at which the tree was introduced to Europe is not known; but it is believed that conquering Arabs brought it from India, its native country, as far W. as Arabia in the 9th century, and later to Italy, S. France, and Spain. A tree at the convent of S. Sabina, Rome, is reputed to date from about 1200; and another at Versailles is said to have been sown in 1421. The first British oranges appear to have been grown by Sir Francis Carew at Beddington, Surrey, from 1595. The principal varieties now grown are the sweet S. Michael's, the bitter Seville, the Jaffa, the Maltese blood, the Washington Navel, Seedling, du Roi, and Valencia Late, also the tangerine and the mandarin.

Most imported oranges have had to be gathered and packed while still green, and undergo a sort of

ripening in transport; consequently they have not the delicious flavour of those ripened naturally on the tree, even in Great Britain. Such fruit cannot compete commercially with the imported article, so that British orange trees are chiefly for ornament. For this purpose they may be raised from seed ("pips") or cuttings, and grown in good loam, to which has been added sharp sand and crushed bones, or dry cow-manure. The seeds will germinate in a warm greenhouse (about 60° F.), and when the plants are large enough they should be transferred to tubs, which may be placed outside in the summer, and in winter given a temperature of 50° F. Sheep-dung mixed with loam should be given as a top-dressing in spring, and during summer they require liberal watering.

The cultivation of the orange on a commercial scale is practised in Florida and California. There seedling orange trees are found to last longest, and are more hardy. They are, however, extremely thorny and the fruit was long regarded as inferior, but seedless navel oranges are now marking an improvement in quality. Oranges are grown commercially also in Palestine, S. Africa, Australia, Jamaica, Spain, and Brazil.

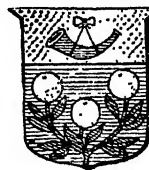
Being gross feeders, orange trees must be well manured. It is essential that they receive plenty of potash; stable manure applied alone causes "die-back." They also require spraying to keep down red-spider, scale, and other insect or fungus pests, while careful pruning is most necessary. Well treated, the orange is extraordinarily prolific. Yields of 16,000 oranges have been secured from a single tree. Orange trees continue in bearing for a number of years; many have borne well for a century. See Citrus.

Orange, GARIEP, OR GROOTE RIVER. Largest river of S. Africa. It rises in the Mont aux Sources (11,000 ft.) in the highest portion of the Drakensberg Range, in the N.E. of Basutoland. Its basin comprises 40,000 sq. m. of the high plateau of S. Africa, and it reaches the Atlantic Ocean about 45 m. N.W. of Port Nolloth. The upper tributaries flow among the magnificent mountains of Basutoland,

and on one of them occur the falls of Malutsinyane or Le Bihan, with a drop of 630 ft. There are no permanent left bank tributaries of any size, but on the right bank is the Caledon, whose basin is a rich grain-growing district. It joins the Orange above Bethulie, and the Vaal joins above Prieska; all other perennial affluents are short.

Below Prieska the Orange flows, often through narrow, almost impassable gorges, for 500 m. in a sandy, arid district, the desolate S. portion of the Kalahari Desert, with numerous tributary valleys usually dry. Below Upington are the Great Falls of Aughrabies, 60 ft. wide, 400 ft. drop, at Waterval, which exceed both Niagara and the Victoria Falls in height, but lack their accessibility and beauty. W. from Palmietfontein the Orange forms the N. boundary of the Cape Province. It was explored in part in 1779 by Colonel Gordon, who hoisted the Dutch flag in the middle of the stream, and named it after the stadtholder of Holland.

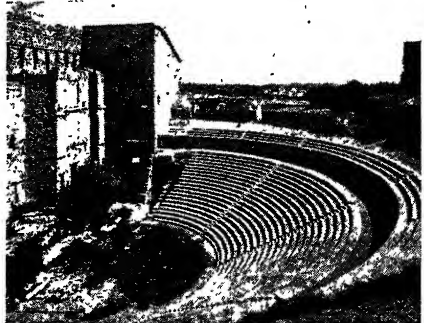
Orange. Town of France. It is on the river Meyne, 17 m. by rly. N. of Avignon, in Vaucluse dept.



Orange arms

The ancient Arausio, it contains a Roman triumphal arch, probably erected about A.D. 25 and extensively repaired since 1825, and a Roman theatre,

dating from the 2nd century, the colossal façade of which is visible from all parts of the town. The tiers of seats were restored in 1894, and the building is now a national theatre in which open-air plays are occasionally performed. The cathedral of Notre Dame dates from the 11th century. Here are textile, dyeing, and tanning industries. A principality which passed



Orange, France. Interior of the Roman theatre, showing the restored tiers of seats

in the middle of the 16th century to the house of Nassau, it was claimed on William III's death by Prussia, which ceded it to France by the treaty of Utrecht, 1713. Pop. 13,978. *See* Orange (family name).

Orange. Town of New South Wales, Australia. Situated 3,000 ft. above sea level, and 190 m. W.N.W. of Sydney by rail, it is the centre of a fruit and wheat growing district, and a rich mineral area, yielding gold, silver, and copper. The town has been since 1830 an important point on the route W. from Sydney over the Blue Mts., first by the main road, and later by the rly. Pop. 12,190.

Orange. City of New Jersey, U.S.A., in Essex co. It lies 12 m. W. of New York and is connected with that city and Newark by rly. Like East, South, and West Orange, it has become an industrial as well as a residential suburb. Hats are made by the large negro and foreign element. Fine residences of New York business people dominate the neighbouring heights. Settled c. 1670, Orange was incorporated as a township in 1806 and chartered as a city in 1872. Pop. 35,399. *See* East Orange; West Orange.

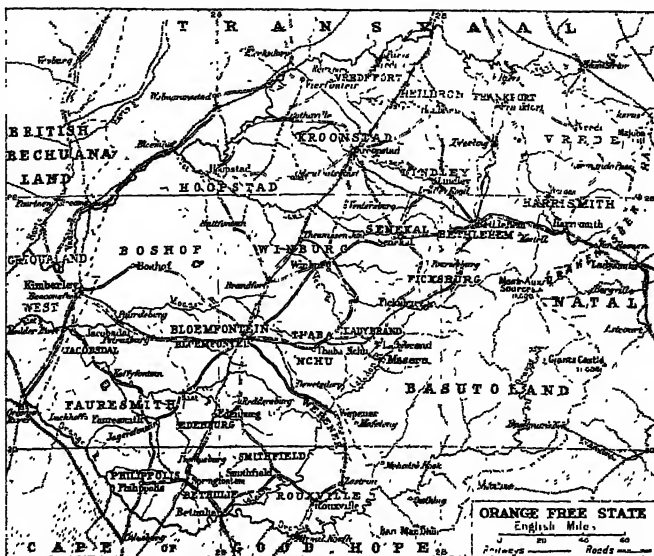
Orange. Name of European family. It is taken from the little French principality of Orange, which had its own rulers from about 900. In 1500 the family died out, and Orange passed to a member of the Nassau family, later princes being known as of Orange-Nassau. One of these was William the Silent. The title was retained by his descendants, one of whom was William III of England; their interests were chiefly in the Netherlands of which a member became king as William I in 1813. *See* Nassau; Netherlands. *Consult* The House of Orange, M. E. Grew, 1947.

Orange Free State or **ORANJE VRYSTAAT**, Province of the Union of South Africa. It is bounded N. by



Orange Free State arms

the flattest stretches of land in the world, it is called the prairie province of S. Africa. The country is an almost treeless tableland at an average alt. of about 5,000 ft., sloping from the Drakensberg



Orange Free State. Map of the province of the Union of South Africa which takes its name from the Orange River

range in the E. to the valleys of the Orange and Vaal rivers, which form its S. and N. boundaries.

The climate is temperate and rainfall moderate, chiefly in the form of violent thunderstorms in late summer. There is some good soil, but irrigation is required in many parts. The farmer has had to struggle against long droughts followed by heavy floods. He is poorer than farmers of the other provinces; for this reason the O.F.S. was known as the Cinderella province. Cattle, sheep, and ostriches are reared. Maize is the chief crop, others being wheat, oats, potatoes, tobacco, and fruit. Rich diamond deposits and coal are worked, and gold and iron are found. Wool, diamonds, and ostrich feathers are exported. Pop. 875,545.

European authority in the country began about 1824, when some Dutch farmers crossed into it from Cape Colony. Previously the only inhabitants had been Hottentots, Bushmen, and other Africans. In 1836 more Dutch farmers arrived, to find suitable land for tilling, and to escape from the jurisdiction of the Cape government. These settlers declared their land a republic. After the British appeared there was continuous trouble, there was no clear dividing line between their spheres of influence. British sovereignty was declared in 1848 but abandoned in 1854, when a Boer republic was formed.

Under the long presidency of Brand, which ended in 1888, the

country prospered, being aided by the opening up of diamond fields. Under his successor, Reitz, the Boer republics entered into closer relations with each other, and in consequence the O.F.S., under Steyn, joined the war against Great Britain in 1899. This ended with the occupation of Bloemfontein and the annexation of the country as the Orange River Colony. In 1902 the Boers acknowledged the rule of Great Britain. Responsible government was given to the prov. in 1907, and in 1910 it joined the Union of South Africa, reverting to the name O.F.S.

To the house of assembly at Cape Town it sends 17 members, and to the senate eight. The franchise is confined to British subjects of the white races. For managing its internal affairs the province has an executive committee of four members, presided over by an administrator appointed by the Union. This is responsible to a council of 25 members elected for three years. The matters under its control include education, and its income is derived from taxation and subsidies from the Union parliament. The judicial system consists of a provincial court at Bloemfontein from which there is a right of appeal to the supreme court.

Bloemfontein is the capital, a city of gardens and stately buildings. Peopled by Dutch and Huguenot stock, it was founded by an Englishman, H. D. Warden. It is an important rail, road, and air junction. One of the chief events in

O.F.S. history was the discovery of gold in 1946 at Odendaalsrust, about 150 m. S.W. of Johannesburg. This was the richest strike in the history of gold mining, Sir Ernest Oppenheimer estimating that it would produce £50,000,000 a year of gold. About eleven new mines will be opened in this area. The O.F.S., hitherto almost completely pastoral, will now be industrialised on a large scale. There has also been a new boom in the diamond industry. See S. Africa; Transvaal; consult The Boer States, A. H. Keane, 1900.

Orangemen's Day. A public holiday celebrated in N. Ireland on July 12. This was the date of the battle of Aughrim, 1691, a victory for Protestants owing allegiance to William III over Catholics who fought for James II.

Orange Society. Irish political association founded in Armagh in 1795 for the defence of Protestantism and the maintenance of the Protestant ascendancy in Ireland. For a century before the Revolution of 1688 there was bitter hostility between Roman Catholics and Protestants in Ireland, aggravated by the regime of the Commonwealth and the plantation, especially in Ulster, of colonies of English Puritans and Scottish Presbyterians. The overthrow of James II by William of Orange made the latter the hero of the Protestant ascendancy, which was then thoroughly established.

In the N., Protestant Peep o' day Boys and R.C. White Boys and Defenders vied with each other in the perpetration of outrages. The antagonism became particularly virulent in Armagh, where the Orange Society sought in effect to make it impossible for R.C.s to live. The society soon came into collision with Wolfe Tone's Society of United Irishmen, which had for its object the union of R.C.s and Protestants for the overthrow of the English ascendancy, though it gradually became an R.C. movement. This society was unjustly held responsible for violence committed in the name of the law in the suppression of the insurrection of 1798; whereas its existence was merely a symptom of the disease of religious animosity affecting both sides. It was, however, antagonistic to the Union of 1801, which was expected greatly to impair Protestant ascendancy.

In the 19th century Orangism was directed to the repression of the movement for Catholic emancipation. It can hardly be said to

have become definitely loyal to the empire until O'Connell's movement for the repeal of the Union, which, since Catholic emancipation had been granted (1829), would have meant the establishment of R.C. ascendancy. See Ireland.

Orange-tip Butterfly (*Euchloe cardamines*). Butterfly of spring, common in British lanes, and distributed over Europe and a great part of Asia. It measures about 1½ ins. across the expanded wings. These on the upper side are



Orang Utan. Specimen of the man-like ape of Borneo and Sumatra, showing its characteristic attitude in the fork of a tree; top, crouching on the ground

mainly white with a black base, and the tips of the fore wings margined with black, broadly in the female, narrowly in the male, in which nearly half the wing is orange. On the under-side the hind wings are heavily blotched with green. When the insect alights on the clusters of small white flowers of Cruciferae or Umbelliferae and elevates its wings over its back, the hind wing becomes part of the flower cluster and the butterfly is invisible as such. See Butterfly, colour plate.

Orang Utan (Malay, man of the woods). Species of anthropoid (man-like) ape (*Pongo pygmaeus*)

found only in Borneo and Sumatra. A full-grown male stands about 4½ ft. high, and its arms are so long that in the erect position the fingers almost touch the ground. The legs are short, and when walking the animal rests on the knuckles of the fingers and the outer edges of the feet, the soles being turned inwards. It thus progresses slowly on the ground, but in the trees it can swing itself along with fair speed, though it seems always to be moving with deliberation. The remarkable disproportion of the limbs distinguishes the orang from the gorilla and the chimpanzee; but, in addition, the skull is differently shaped, and the numbers of the vertebrae and wrist bones are different. In almost all its special anatomical features the orang is further removed from man than the other large anthropoids.

The head of the orang is compressed from back to front, giving the appearance of a high forehead,

and the jaws project considerably. In old males huge ridges develop down the cheeks, and the skin round the neck is distended in such a fashion as to suggest the disease known as goitre. The skin is covered with long, shaggy, reddish-brown hair, and in old animals there is often a full beard.

Orangs occur in the densest forests, and are usually found in families consisting of the two parents and a few young ones. They construct strong but rough nests of sticks in the trees, in which they pass the night. They feed by day, principally on fruit, though they

also eat leaves and shoots. In captivity, young specimens are docile and affectionate.

Oracón. Aboriginal tribe of cultivators, mostly in Bihar, Orissa, and the Central Provinces, India. Calling themselves Kurukh, they number some 700,000; one-fourth have become Hinduised in religion and speech, while three-fourths are still wild hill-dwelling animists. They worship visible objects, such as stones and posts, and at their annual Khaddi festival, for ensuring good crops, their aboriginal deity, Dharmesh, is symbolically wedded to Mother Earth. Their Dravidian language, allied to Khond, is intermediate between the Tamil and Telugu groups.

Oratorians. Familiar term for the R.C. Congregation of the Oratory of Our Lord Jesus Christ, and that of the Oratory of S. Philip Neri (*q.v.*). The first named was founded by Cardinal de Bérulle, at Paris, in 1611, composed of priests, and was instituted to deepen devotion, promote professional studies, and generally to strengthen ecclesiastical discipline. Its rule was adopted by the Oratory of the Immaculate Conception founded at Paris in 1852. The Oratory of S. Philip Neri dates from 1564. In 1575 it was given the old church of the Vallicella, Rome, on the site of which S. Philip caused a beautiful new oratory to be erected. The society is composed of priests without vows, but agreeing to a rule approved by Paul V in 1612. Each house is independent. It was introduced into Great Britain in 1847 by J. H. Newman, and its chief centres in England are at Birmingham and Brompton (*q.v.*).

Oratorio (Ital., first used at musical services given at the Oratory of S. Philip Neri). Sacred story or drama set to music, in which solo voices, chorus, and instruments are used. It occupies in sacred music the place that opera occupies in secular music, but is performed without scenery, costumes, etc.

About 1574, S. Philip Neri (*q.v.*) introduced into his Oratory in Rome the acting of sacred dramas, more refined than the medieval morality plays, and interspersed with sacred music. Hence the name, which is the Italian form of oratory. The earliest surviving oratorio is *The Representation of the Soul and the Body*, composed by Giulio Cavaliere and performed in the Oratory, 1600. The composer, who died before the first performance, left complete directions as to the performance, which

included dancing and gestures. No further development followed until Carissimi increased the importance of the chorus in two works, *Jephthah* and *Jonah*. A pupil, A. Stradella, reached a higher standard in *S. John the Baptist*, 1676. But oratorio in Italy gradually came under the same influences as determined the form and character of opera, the solo singers becoming increasingly important at the expense of the chorus.

Passion Music

In Germany the religious character of the people revealed in the Reformation was also seen in the special attraction which the Passion story had for them. The four settings of the Passion by Heinrich Schütz (b. 1585) mark a beginning in that special form of oratorio which led to the great Passions of J. S. Bach, though the earliest surviving example of German oratorio is Schütz's *Resurrection*, composed before his Passions. Bach's chief works in this form are his two Passions—*S. John*, 1723, *S. Matthew*, 1729—and his *Christmas oratorio*, 1733. The Passions of Bach differ from the ordinary oratorio form in emphasising important points of the story by the introduction of solos and choruses of a reflective and meditative character, also by means of chorales intended to be sung by the whole audience. Handel's oratorios were written as a form of musical entertainment, several being first produced at the same theatre as that at which his operas were produced. The majority follow more or less closely a particular Biblical story: *e.g.* *Israel in Egypt*, *Saul*, *His Messiah*, 1742, however, aims at a presentation of the whole scheme of salvation. The choruses are the great feature of Handelian oratorio.

Haydn's *Creation*, 1798, presenting a series of tone pictures, was the first oratorio in which orchestral accompaniment was treated on modern lines. In Spohr's *Last Judgement*, 1826, a still more modern feeling is emphasised by the free use of the chromatic harmony characteristic of this composer's work. Of Mendelssohn's three oratorios, *Hymn of Praise*, *S. Paul*, *Elijah*, the last, composed 1846, reveals most clearly the composer's complete mastery of the use of chorus and orchestra to secure vivid and dramatic effect. From his time the majority of oratorios have been written either by English composers or for English performance. Works in which the chorus is important have

always made a special appeal to Englishmen. The variety of scheme and treatment adopted by later composers is seen in Gounod's *Redemption*; Parry's *Job*; Elgar's *Dream of Gerontius*, *Kingdom*, and *Apostles*; Walton's *Belshazzar's Feast*. See Bach; Elgar; Handel; Mendelssohn; Messiah; Music; Passion.

Oratory (Lat. *orare*, to speak). The art of speaking in order to please or persuade the hearers. It first became a force in the Greek republics. In 4th century Athens the sophists (*q.v.*) made it their aim to teach oratory as a means to personal success. Eloquence was brought to its perfection, and Demosthenes, surmounting many physical disabilities, attained an excellence never surpassed. Under the Roman republic, public speaking became a leading means of acquiring power, honour, and distinction. Roman oratory was marked by method and stateliness, but lacked the spontaneity and sensitiveness of the Athenian; Cicero, by the magic of his style, stands alone. The first orator to receive a salary from the state as a public teacher was Quintilian, a pleader in Rome. He wrote instructively on the subject, explaining in his *Institutiones Oratoriae* what constitutes the well-graced orator. The artificial oratory of panegyrics and academic declamation was taught by professional rhetoricians such as Dion (*q.v.*) Chrysostom, until with the decline of the empire and the rise of Christianity a new form of eloquence, that of the pulpit, was established, of which S. John Chrysostom (*q.v.*) was a master.

During the Middle Ages oratory suffered from the dominance of scholastic rules, though some of the friars cultivated unconventional popular methods. In later times, although magnificent oratory was heard from the pulpit, the art became increasingly associated with parliamentary politics and the law courts. The 1st Earl of Shaftesbury, an earnest student of Cicero, was the first great parliamentary debater, creating a tradition that developed through the 18th century into the classic exercises of Pitt, Chatham, Sheridan, Fox, and Burke, which remained the model of parliamentary style until the 20th century. H. H. Asquith is sometimes said to have been the last parliamentary orator in the classic tradition.

If contemporary oratory shows a decline, it is largely because the spread of the reading habit has

rendered it to some extent superfluous. Sermons and parliamentary speeches alike have become ever shorter. At the same time, and perhaps inevitably, a certain mistrust of the orator's art has become apparent, so much so that one subtle method of practising it with success is to make a profession of disclaiming it, as did Mark Antony ("I am no orator"), Abraham Lincoln ("The world will little note nor long remember what we say here"), and the 1st Earl Baldwin, one of the most skilful and appealing orators of the 20th century—as well as the many lesser speakers who open their discourse with some variant of the well-worn phrase "Unaccustomed as I am to public speaking." The rantings of Hitler and Mussolini to the accompaniment of synthetic applause brought the art into further disrepute; and the broadcasting microphone has proved itself unkind to any speaker with pretensions to the traditional oratorical devices.

Contemporary public speaking tends to be brief and to the point, divested of rhetoric and dramatic vocal inflexion, though not of wit. Gesture and facial expression are reduced to a studied minimum. Nevertheless, so long as there is any occasion for public speaking, those who would be successful practitioners of the art will need to study its demands even if their artistry must remain concealed; while the born orator—a Lloyd George, a Birkenhead, a Winston Churchill, a W. J. Bryan, or a Franklin Roosevelt—may observe or ignore the prevailing canons as he pleases without ever failing to command attention. *See Rhetoric.*

Oratory. CONGREGATION OF THE. Roman Catholic congregation of priests, founded at Florence in 1556 by S. Philip Neri, popularly known as the Oratorians (*q.v.*).

Orbit. (Lat. *orbis*, a circle). Bony socket containing the eye (*q.v.*).

Orbit. In astronomy, the path of a heavenly body in space. The orbit of a body in the gravitational field of a central mass is a conic section: an ellipse, parabola or hyperbola. Neglecting small perturbations, the orbits of the planets are ellipses, while certain comets move in parabolic or hyperbolic orbits. At any given distance from the sun there is a definite velocity called the parabolic velocity which a freely falling body would acquire if it had entered the gravitational field of the sun from an infinite distance. Any body moving in any

direction with exactly this critical velocity will move around the sun in a parabolic orbit; if it moves faster than this, it will describe a hyperbola; if slower, an ellipse. The branch of astronomy dealing with orbits of planets and comets is known as celestial mechanics.

In atomic physics, the hypothesis of electrons moving in orbits round the positive nucleus forms the basis of Bohr's theory of the hydrogen atom. Bohr made two fundamental postulates, viz. that (1) only those orbits are permissible for which the angular momentum of the electron is a whole multiple of $\frac{h}{2\pi}$ where h is Planck's

constant; and (2) the atom radiates energy only when an electron jumps from an orbit of higher to one of lower energy. This theory has since been modified and under de Broglie's hypothesis of wave-mechanics, instead of the electron moving in a stationary orbit, it is supposed that there is a series of waves in this orbit, which produce a stationary wave-system.

Oragna. Name sometimes given to the Italian sculptor Andrea di Cione (*q.v.*).

Orchard. Plot of land devoted to the cultivation of fruit trees which are generally grown as standards. As these will not yield freely until well developed it is good practice to set bush-shaped trees, budded on a dwarfing stock, as well as soft fruits, among them; these will come into bearing while the standard trees are growing up. When no longer profitable owing to the encroachment of the standards they are uprooted. The best site for an orchard is on well drained loamy ground sloping gently to the south-west and protected from north and east. Nut, plum, and damson make good shelter trees. An orchard should not be planted on low-lying land among hills or in a bleak position where spring frosts may damage the blossoms. For the first 8 or 10 years the soil must be kept clear of grass and weeds for 3 or 4 feet round the tree stems. Standards must be staked securely and wired against rabbits; they are planted 25 feet apart, bush-shaped trees 12 feet, and gooseberry and currant bushes 5 feet from each other. *See Fruit Farming.*

Orchard-house. Name given to a glass-house in which fruit trees, grown in large pots or planted in a border of soil, are cultivated. The best type of glass-house for this purpose is the span-roof. Fruits suitable for the

orchard house are peach, nectarine, cherry, apricot, fig, grape, and choice varieties of apple, pear, and plum. If the trees are grown in pots they may be placed out of doors after the fruits have been gathered, thus leaving the glass-house free for salad crops, tomatoes, and chrysanthemums; the trees must be replaced under glass by December.

Orchardson, Sir William Quiller (1835-1910). British painter. Born in Edinburgh, March

27, 1835, he studied at the Trustees' Academy, and settled in London in 1862. He became A.R.A. in 1868, R.A. in 1877, and was knighted in 1907. He painted historical genre



Elliott & Fry

with a definite aesthetic motive; but the oft-repeated brown tone of his pictures later developed into a mannerism. His most famous picture is that of Napoleon on board H.M.S. Bellerophon, now in the Tate Gallery. He also painted portraits, especially during his later years. He died April 13, 1910.

Orchestra (Gr. *orchesthai*, to dance). Musical term. Before 1720 it was used only in its Greek sense, meaning the place in the theatre where the chorus danced. Although records of concerted instrumental music go back to antiquity, there is no evidence to show that these concerted efforts were anything more than a haphazard collection of instruments without thought of balance or the niceties of instrumental colour and sonority. Even as late as the 16th century, usually described as the golden age of polyphony, a band of instrumentalists used for some ceremonial occasion or as an accompaniment to church choral music might vary from a collection of trombones, cornetti (an obsolete wood and ivory instrument bearing no resemblance to the cornet), violas, and bassoons, to a band consisting of viols, violins, lutes, lyres, harps, trombones, recorders, oboes, and organs. In the actual writing for these bands of instruments there was little or no feeling for instrumental style; in fact, when instruments were added to a choir they merely doubled the vocal parts.

The beginning of opera and the demand for intensified dramatic

expression in the music brought about the creation and early development of the modern orchestra. In fact, it may be said that opera has been a constant spur to the expressive potentialities of the orchestra. The first great composer of opera was Monteverde (1568-1643), who realized the possibilities of colour and helped to create balance and organization in instrumental bands or groups. The 17th century was a period of experiment during which composers gradually and somewhat laboriously evolved a definite style in writing for the strings and laid foundations of a string orchestra divided into either three or five parts, eventually giving way to a four-part division. With the emancipation of the cello a century or more later, the string section of the modern orchestra was divided again into five parts.

It took nearly another century to establish a cooperative, but at the same time independent and flexible, wind section of the orchestra. At first the addition of wind instruments to strings was governed by the necessary but haphazard method of using what instruments happened to be available. What is important to remember is that during the 18th century the actual style and texture of music itself was undergoing a change—a change from the polyphonic to the harmonic style, from the vocal to the instrumental style.

The new style of music (the classical style, we call it) with its appropriate new forms, e.g. the symphony, was brought to its highest stage of perfection by Haydn and Mozart, who established the principles of modern orchestration and a finely balanced instrumentation of the concert orchestra itself, consisting of two flutes, two oboes, two clarinets, two bassoons, two horns, two trumpets, drums, and strings in four parts (cellos and basses almost invariably playing the same part at the interval of an octave). However, it must not be forgotten that the great contributions of Haydn and Mozart to the development of the orchestra would not have been possible if the ground had not been well prepared for them by the work of a host of talented and industrious forerunners, notably Bach's two sons—C. P. E. and J. C. Bach—and a group of composers, headed by Carl Stamitz, which flourished in Mannheim during the middle years of the 18th century.

In opera the French Rameau and the German Gluck were responsible for many innovations,

particularly Gluck, who evolved not only a true orchestral style as distinct from his vocal style, but realized and experimented in the potentialities of instrumental colour and dramatic expression. In the preface to his opera *Alceste* he claimed that instruments ought to be used "in proportion to the degree of interest and passion in the words." Gluck was one of the first to realize the possibilities of the clarinet, which was then a new instrument. He also added trombones and more percussion instruments to his orchestration. The two outstanding characteristics of his orchestral style were the greater independence and individuality given to each section of the orchestra and the fuller and richer use of harmony.

Haydn and Mozart also introduced the clarinet in their later symphonies, but it was not until Beethoven wrote his Fifth Symphony (1804) that trombones were used in the concert orchestra. Beethoven treated the orchestra very sensitively, and much of what awkwardness there may be in his writing is due to mechanical defects of the instruments at his disposal, such as the horn.

Nineteenth-century Development

During the first half of the 19th century the range and flexibility of the orchestra was considerably increased by a generally higher standard of string playing, the emancipation of first the cello and then the viola as melody instruments in their own rights, and by the improvements in the valve mechanisms of wood-wind and brass instruments.

Weber, the first German Romantic composer of opera, showed a wonderful sense of orchestral tone colour, and he used the instruments of the orchestra, both singly and in combination, as an artist uses his palette. He was, however, surpassed by the French Berlioz, who was one of the most original minds in the development of the art of orchestration.

The still further extension of harmonic resources and the increase of virtuosity in all instrumental technique combined to offer in the orchestra a magnificent medium of expression to composers of the second half of the 19th century. Wagner used the orchestra in his great music-dramas with the power, imagination, and skill of genius. Like his younger contemporaries, Rimsky-Korsakov, Debussy, Mahler, Strauss, and many others, Wagner conceived his music in terms of the orchestra,

and not as a kind of transcription or arrangement of music conceived first of all in terms of string or piano tone.

Mastery of the orchestra is the stock-in-trade of every 20th century composer, but new and distinctive sonorities and timbres have been constantly added—notably by Puccini, Sibelius, Ravel, Schönberg, Bartók, Berg, and Britten.

The tendency in the development of the orchestra from Bach to Britten has been the increasing of size and complexity. In the 18th century and the first half of the 19th century orchestras varied in size and instrumentation according to the wealth and importance of their patrons. At Leipzig in 1730 Bach's orchestra consisted of six first and second violins, two violas, two cellos, one bass, two flutes, two oboes, one bassoon (an apprentice), and two trumpets. At London in 1791 the orchestra for the famous Salomon concerts, for which Haydn wrote twelve symphonies, consisted of twelve to sixteen first and second violins, four violas, three cellos, four basses, two flutes, two oboes (clarinets probably engaged when needed), two bassoons, two horns, two trumpets, and one set of drums. In 1841 the Berlin Opera consisted of eighty-two players including two harps and four each of all wind and brass instruments. Finally in 1939 the B.B.C. Symphony Orchestra consisted of about one hundred and ten players.

Ralph Hill

Orchestration OR INSTRUMENTATION. In music, the art of planning music for the orchestra, allotting to each instrument its most suitable duties in view of both its tone and its technique. *See* Full Score; Instrumentation; Orchestra; *consult also* A Treatise on Modern Instrumentation, H. Berlioz, Eng. trans. M. C. Clarke, new ed. 1904.

Orchha. Town and former state of India, now in the Vindhya union. The state lay between the Jamm and Dhasan rivers between Jhansi and Chhatarpur. Its area was 1,999 sq. m. Pop. 363,405. The town, the former capital of the state, is situated on the Betwa. An imposing fortress is connected with the town by a wooden bridge.

Orchid. Family of plants found wild, chiefly in tropical countries. The number of species or wild types runs into thousands. The flowers are extraordinarily varied in shape and size and many of them are exquisitely coloured.

Some, classed as epiphytes, are found on trees; others, known as terrestrial, grow in the soil. The growth is often in the form of a thick, flattened, stem-like structure called a pseudo-bulb, from which the leaves are produced. Almost all kinds must be, in cooler climates, cultivated under glass, those from a tropical climate in a minimum temp. of 65° F. at night and rising much higher by day.



Orchid. 1. Green-winged orchid, *O. morio*. 2. Flower of Butterfly orchid, *Habenaria bifolia*. 3. Fragrant orchid, *Gymnadenia conopsea*

Those native to high altitudes are grown in a glasshouse having a minimum temp. of 50° or even 45° F. Others are suited by the temp. of a warm or intermediate glasshouse where the temp. does not fall below 60°.

Most orchids can be grown to perfection only in glasshouses specially built, where they have expert care. A few, however, will flourish in an amateur's greenhouse among other plants needing warmth. Watering, ventilation, and keeping the air of the glasshouse moist are important details of cultivation. When growth for the year is complete orchids need watering less frequently, but the ventilators must be managed so that draughts are prevented. To prevent the air in the glasshouse from drying out it is usual to cover the staging with shingle and to keep this moist by syringing.

The difficulty of obtaining fuel for heating greenhouses not devoted to food crops led, during and after the Second Great War, to a reduction in the collections of hot-house plants including orchids, while the importation of orchids

steadily declined. Some of the orchids which may be grown successfully in an amateur's warm greenhouse are lady's slipper or cypripedium, some of the cattleyas, odontoglossum, dendrobium, cymbidium, lycaste, coelogyne, and masdevallia.

Although the wild types of orchids number many thousands through crossbreeding by professional and amateur growers of some genera, e.g. cymbidium, cypripedium, and cattleya, the hybrids raised artificially outnumber the species introduced from abroad. Established orchids are repotted at various periods of the year, the best time being when fresh root growth is seen. It is unnecessary to repot them every year.

The terrestrial orchids, e.g. cypripedium, lycaste, and coelogyne, are grown in well-drained pots

in a compost of three parts loamy soil, one part of osmunda fibre, one part of sphagnum moss, and a free scattering of small pieces of broken flower pot. A compost which suits cattleya, laelia, and a number of other popular kinds consists of three parts osmunda fibre and one part sphagnum moss; free drainage is most necessary. Some kinds, e.g. vanda, aerides, oncidium, can be grown in suspended baskets.

The hardy orchids, some of which grow wild in Great Britain, are smaller and far less showy than those cultivated under glass. Most of them need to be planted in loamy soil in cool, slightly shaded places in the rock garden. One of the finest is the Madeira orchid (*Orchis foliosa*). Another striking flower is the North American *Cypripedium spectabile*, which needs peat and leaf mould but not shade. The butterfly orchid (*Habenaria*), the bee orchid (*Ophrys apifera*) are two attractive native species. Others are the early purple *Orchis mascula*, commonest of all, the spotted *Orchis maculata*, the green man orchid (*Aceras*), and the sweetly-scented *Gymnadenia conopsea*.

Orchis (Gr., testicle). Large genus—about 70 species—of herbs of the family Orchidaceae. They are natives of Europe and Asia, and a few of N. America. They have usually a pair of egg-shaped tubers, which suggested the old Greek name; in some species these are flattened with finger-like prolongations (palmate). The annual stem is wrapped around by the few strap-shaped leaves, which sometimes are spotted or blotched, and ends in a spike of irregular flowers, which by the twisting of the ovary are reversed.

Of about a dozen British species the best known are the early purple orchid (*O. mascula*) and the spotted orchid (*O. maculata*). The former, which appears in April in copses and pastures, has the typical oval tubers and the leaves spotted with purple-black. The flowers and the upper part of the stem are red-purple. *O. maculata* has the tubers flattened, and the flower-spike more pyramidal, the flowers pale lilac marked with streaks and curved lines of purple. The pyramidal orchid, handsome but evil smelling, grows on limestone. See Bee Orchid; Butterfly Orchid; Ophrys; Orchid.

Orcus. In Roman mythology, name of the god of the lower world, subsequently identified with Hades or Pluto. Orcus is also used for the lower world itself. See Hades.

Orczy, EMMUSKA, BARONESS. (1865–1947). British novelist and playwright. Born at Tarnaörs, Hungary, daughter



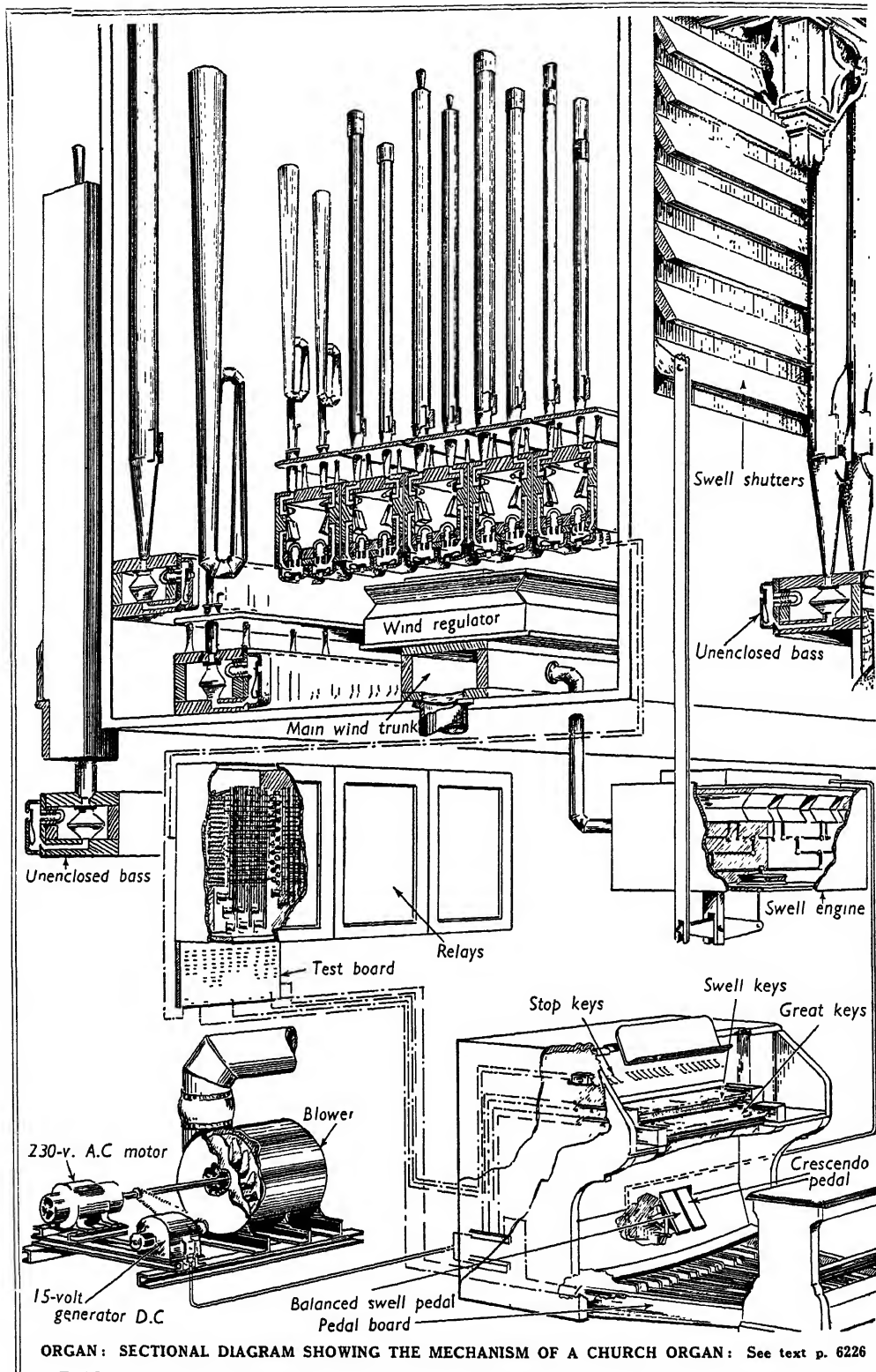
Baroness Orczy,
British novelist
Russell

of Baron Felix Orczy, she was educated at Brussels and studied painting in London. In 1905 she published *The Emperor's Candlesticks*, also (after its rejection by 12 publishers) a tale of the French Revolution, *The Scarlet Pimpernel*, dramatised in collaboration with her husband, Montague Barstow, and produced by Fred Terry and Julia Neilson at the New Theatre, London. The play's success brought immense sales for the book, which was followed by many sequels during the ensuing 30 years. She wrote many other "cloak and sword" romances, and three other plays, though none of the latter attained any comparable triumph. She died Nov. 12, 1947, shortly after the publication of her memoirs, *Links in the Chain of Life*. See *Scarlet Pimpernel*.



1. *C. maculata* (Spotted Orchid), Europe, N. Asia. 2. *Epipodisma*. 3. *Epipodisma*. 4. *Epipodisma*. 5. *Epipodisma*. 6. *Epipodisma*. 7. *Epipodisma*. 8. *Epipodisma*. 9. *Epipodisma*. 10. *Epipodisma*.
 1. *C. maculata* (Spotted Orchid), Europe, N. Asia. 2. *Epipodisma*. 3. *Epipodisma*. 4. *Epipodisma*. 5. *Epipodisma*. 6. *Epipodisma*. 7. *Epipodisma*. 8. *Epipodisma*. 9. *Epipodisma*. 10. *Epipodisma*.

ORCHID: RARE AND COMMON VARIETIES SHOWING FANTASTIC FORM AND COLOURING



ORGAN: SECTIONAL DIAGRAM SHOWING THE MECHANISM OF A CHURCH ORGAN: See text p. 6226

Ordainers, LORDS. Body of 21 peers appointed in 1310, by a parliament consisting of peers only, to amend the unsatisfactory government of Edward II. It was arranged that they should administer affairs for 18 months and then formulate proposals. These proposals, known as the ordinances of 1311, secured the expulsion of Gaveston, the king's disreputable favourite, and of other foreigners, various limitations of the royal power, and the summoning of Parliament once a year. See Edward II; England: History.

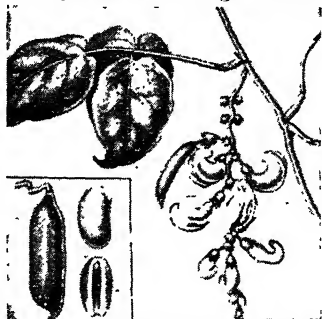
Ordeal. Ancient form of trial *per Dei iudicium*, by judgement of God. The underlying belief that Divine providence would intervene to protect the innocent from unjust condemnation is of remote antiquity and universal distribution. A test of innocence of infidelity by drinking bitter water mixed with dust from the floor of the tabernacle (Numbers 5) shows that the practice was in use among the Jews. That it obtained among the ancient Greeks is proved by a passage in Sophocles' *Antigone*, where the watchman protests his readiness to hold red hot iron in his hand and walk through fire, to prove his innocence of Cleon's charge of having given Polynices proper burial.

Among the Anglo-Saxons the test generally took one of four forms: ordeal by battle; ordeal by fire—either by handling hot iron, or walking blindfold and barefoot over red hot ploughshares placed at irregular intervals; by hot water, when the suspect plunged his arm up to the elbow into boiling water; or by cold water, when the suspect was flung into a stream or pond and, making no effort to swim, either sank, when he was deemed innocent, or floated, in which case he was convicted and punished.

Legal ordeals were abolished in England under Henry III, with the exception of trial by battle, which actually survived on the statute book until 1818, when it was abolished in consequence of the right to trial by battle being claimed by a man charged with murder. Swimming, or floating, was the common method of testing witches until the 18th century, the women being bound right thumb to left toe and left thumb to right toe, in which position they could not keep themselves afloat, and were left to the judgement of heaven. See Divination; Duel: Trial by Battle.

Ordeal Bean (*Physostigma venenosum*). Perennial climbing herb, member of the family Legumi-

nosae, native of tropical Africa. The leaves are broken into three leaflets. The purple, bean-like flowers are in sprays, and are succeeded by dark-brown pods containing two or three large blackish



Ordeal Bean: foliage and flowers. Inset, seeds, showing the hilum or deep groove

or brown seeds with a deep groove (hilum) along one side and around one end. These seeds are extremely poisonous, and are employed by the natives of Old Calabar as an ordeal for those suspected of witchcraft. The suspect has to eat beans until he vomits and so prove his innocence, or he dies, and so proves his guilt. It has been found useful in ophthalmic surgery for contraction of the pupil of the eye.

Ordeal of Richard Feverel. THE. Novel by George Meredith (*q.v.*), first published in 1850 with the sub-title of *A History of Father and Son*. The earliest of its author's series of fiction studies of modern life, this story is by some critics regarded as on the whole the greatest of them. Its theme is the danger of applying academic theories to education for practical life. The story represents the best qualities of Meredith as a novelist, his wit, humour, poetry, and rare skill in psychological analysis.

Order (Lat. *ordiri*, to begin). Word used in several senses. Its prime meaning is that of a series or row, hence an order or regular arrangement. From this came the idea of obedience, and so we have the use of the word for a command.

To-day an order means a class of persons united together in some way. Such are the orders of knighthood and other orders of the same kind, which do not carry the honour of knighthood, the order of merit, for instance, and the monastic and other religious and semi-religious orders. (See Knighthood; Merit, Order of; S. John of Jerusalem; Knights Templars, etc.)

In the sense of a command the word is frequent in military and naval language, for instance, close order, fighting order, sealed orders, etc. The same idea is seen in

ecclesiastical matters, the order of service and the phrases Holy Orders and minor orders being examples. It is the same in business, in such phrases as payable to order. In a related sense order implies good and peaceable conditions, *e.g.* public order and to maintain order. (See Holy Orders.)

In natural science, especially in zoology and botany, an order refers to a number of genera having important points in common. It is thus intermediate between a class and a family. In architecture, an order is one of the different ways in which the column, with its various parts and its entablature, are moulded and related to each other. There are three main orders, Doric, Ionic, and Corinthian, and two minor ones, Tuscan and Composite. See Architecture; Column; Corinthian Order; Doric Order, etc.

Ordericus Vitalis (1075–1142). Medieval chronicler. Born near Shrewsbury, England, Feb. 16, 1075, the son of a French priest and an English mother, he passed the greater part of his life in the Norman monastery of St. Evroul. About 1123 he began to write the history of the monastery, but this was soon expanded into a general history, although described as *Historia Ecclesiastica* only. He had good sources of information about England as well as France, and the part of his work which deals with his own age, the eighty years after the Norman conquest, is a valuable contribution to the history of the two countries. It has been edited by French scholars and translated into English.

Order-in-Council. In the United Kingdom, and also in Canada, Australia, and other parts of the British Empire, an order issued by the sovereign on the advice of the privy council. It is thus a method of legislation, having taken the place of the proclamations issued by the Tudor and later sovereigns.

The place of orders-in-council in the parliamentary system is maintained by a fiction. Theoretically they are issued by the advice of the privy council, but in practice, on the advice of only a few of its members, who are also members of the Government, and as such responsible to Parliament. These orders were first issued in the 18th century, and a notable instance was in 1807–8, when by them all vessels were forbidden to trade with ports under French control. (See Berlin Decree.) They were extensively used during both Great Wars, especially for matters of urgency. Orders-in-Council are used to carry out Acts of Parliament. Towards

the end of the nineteenth century, owing to the mass of new legislation, the custom sprang up of drafting Acts of parliament in very general terms, giving very extensive powers to ministries to formulate the details as they thought best, and carry them out by issuing orders-in-council. See Statutory Instrument.

Orderly. Name given in the British army and air force to a soldier or airman who serves as a messenger or attendant. Orderlies are attached to squadron, battalion, company, or other unit headquarters, while others attend officers on duty. Hospitals, sick quarters, and dental centres have orderlies to assist the medical officers. Every unit of squadron or company strength upwards has an orderly sergeant and orderly corporal who do duty on rota and are responsible for routine duties such as parades, guards, etc., over a period of 24 hours. An orderly officer is an officer who is on a 24-hour duty and is responsible during that period for administrative routine. The office dealing with the clerical work of a unit is called the orderly room.

Ordinal Numbers. Name given to those words used to indicate the position of something in a sequence. First, second, third, etc., are ordinal numbers. One, two, three, etc., are called cardinal numbers, though the latter are also used as ordinals, e.g. in numbering the pages of a book.

Ordinance (Fr. *ordonnance*). Edict used by authority. Specifically, the term is applied in Great Britain to an Act of parliament not sanctioned by all three estates of the realm, e.g. the self-denying ordinance (q.v.) passed by the Long parliament in 1645 at Cromwell's instigation. Temporary Acts of parliament and Acts which are merely declaratory are also called ordinances. The edicts issued by the kings of France from the time of Philip IV until the Revolution in their own name, and having the force of laws, were termed *ordonnances*. The ordinances affecting the press and the reconstruction of the chamber of deputies issued by Charles X, July 26, 1830, were the immediate cause of the revolution and his enforced abdication, Aug. 2, 1830. In its connotation of an established rule or rite the word ordinance is also used, especially by Presbyterians, of the sacraments, as the ordinance of baptism. See Ordainers, Lords.

Ordinary. In heraldry, the commonest charge. They are

mostly plain symbols, composed of broad bands. They are among those found on the earliest feudal coats, and by old writers are referred to as the "honourable ordinaries." They are supposed to occupy one-third of the shield, but generally are given less space. Most of the ordinaries have "diminutives," usually smaller representations of the parent charge. The first diminutive occupies half the space of the ordinary, and so they diminish by half at each step.

The names of the ordinaries are chief, pale, or paller, bend, bend sinister, fess or fesse, chevron, cross, saltire, quarter, and pile.

All ordinaries and most of their diminutives may be charged, i.e. ornamented with another ordinary, a diminutive, or some other figure; and they can also be "surmounted," i.e. another ordinary, or an animal or monster, may be placed over them. On the other hand, an ordinary may surmount some ordinary charge. Most of them may be "voided," i.e. only a border is shown, the tincture of the field showing between. See Heraldry, colour plate.

Ordinary. In ecclesiastical law, an ecclesiastic who exercises jurisdiction within a given district. In England it usually means the bishop of the diocese or his chancellor acting by his authority. The expression Ordinary of the Mass means the fixed portion of the service as distinguished from the variable parts—such as collects, gospels, etc.—proper to special occasions. In common parlance, it is applied to the service generally, with the exception of the canon, which consists of the prayer of consecration and its adjuncts. See Bishop.

Ordinary Shares. The shares in the capital of a limited company which are entitled to dividend, and, in liquidation, to repayment, only after the claims of debentures and fixed interest preference shares. There may be two classes of ordinary share, the superior being then designated preferred ordinary shares and the inferior either deferred ordinary or merely ordinary. While a higher class of share thus takes preference over the ordinary share from both an interest and capital point of view, it is important that, after the claims of the fixed interest shares and debentures have been satisfied, the whole of the remaining profits available for distribution, and the remaining assets, belong to the ordinary shareholder. In a successful concern he frequently re-

ceives a much higher rate of interest and possesses a far higher proportion of the assets of the concern than does the holder of shares of a superior class. For that reason the price quoted on the Stock Exchange for ordinary shares (or units of ordinary stock) in the capital of a company often exceeds many times the price quoted for the same company's debentures or preference shares.

Ordinate. In mathematics, the length of the straight line drawn from any point parallel to one of a pair of Cartesian coordinate axes, to meet the other axis. See Coordinates.

Ordination. Ecclesiastical rite in which Holy Orders are conferred upon deacons and priests. In the Greek, Roman, and Anglican communions the rite includes the laying on of hands by a duly consecrated bishop; in the Presbyterian churches the ordination is by the Presbytery. The subject is one of great controversy associated with the Apostolic Succession (q.v.).

Since the beginning of the 17th century the validity of Anglican orders has been contested by the Roman Catholic church. On Sept. 18, 1896, Leo XIII issued a Bull, *Apostolicae Curae*, pronouncing that ordinations performed by the Anglican rite have been and are utterly invalid and altogether void; to which Archbishops Temple and MacLagan replied, Feb. 19, 1897. For some 40 years the Anglican succession derived from Matthew Parker (q.v.), and a crucial point of the controversy is the validity of his consecration.

Deacons and priests are ordained on the four Sundays following the Ember Weeks, the canonical ages being 23 for deacons and 24 for priests. Ordination is a sacrament in the Greek and Roman churches. See Holy Orders; Thirty-Nine Articles.

Ordinance. General designation of all weapons of warfare of greater calibre than a rifle. More specifically, and in the British army, the term ordinance includes the provision, storage, distribution, and maintenance of arms and ammunition of all kinds, personal and camp equipment, vehicles and armour, clothing, and all stores except food. A special unit, the Royal Army Ordnance Corps (q.v.) is responsible for all these duties except the maintenance of guns, armour, and electrical equipment, which is the responsibility of the Royal Electrical and Mechanical Engineers (q.v.). Similar services are

provided for the navy by the directorate of naval ordnance, and for the R.A.F. by equipment and maintenance units.

Ordnance Artificer. Non-commissioned officer of the British navy. The branch to which he belongs was established in 1919, to provide personnel to maintain naval armament. Men are enrolled as chief ordnance artificer and ordnance artificer, and are given the status of chief petty officer. *See* Armour, Naval; Armourer; Artificer.

Ordnance Board. A British advisory committee of experts in armament. Officers from all three services are detailed to act on the committee, which also includes civilian scientists. Its functions are to consider inventions relating to both weapons and ammunition, suggest suitable designs for specific purposes, investigate failures and accidents, and advise the authorities on all questions of ordnance manufacture and practice.

Ordnance Factory. Factory maintained by the British govt. for the manufacture of armaments and other war material required by the army and navy, and ammunition for the R.A.F. During the Second Great War large numbers of additional factories were built by the ministry of Supply and operated directly by the govt., while others were erected by the govt. and the production in them carried out by private firms engaged on govt. contracts. Factories building aircraft for the R.A.F. came under control of the ministry of Aircraft Production. *See* Munitions.

Ordnance Survey. A topographical survey of the U.K. In 1747, following the Jacobite rebellion of 1745, General Watson organized the making of a map of the Highlands, but the ordnance survey cannot be said to have come into existence until 1784, when General Roy measured a base line on Hounslow Heath.

An ordnance survey department was established in 1791 under the joint direction of the Master Gunner (*q.v.*) and the ordnance department to prepare a map of Great Britain on a scale of one inch to the mile. Civil recruitment was introduced in 1824, when a 6-in. survey of Ireland was begun. The office of works took it over in 1870, and the board of agriculture in 1889. It is now administered by the ministry of Agriculture and Fisheries, but the director general has always been a military officer and R.E.

officers have always been in charge of the actual field work. Maps of Ireland are no longer issued by the organization, but it issues maps of Great Britain on a number of scales, based on the 1/2,500 survey—25 ins. to the mile, commenced in 1855, and completed about 40 years later, and since constantly revised. The ordnance survey also carries out surveys for land registration, tithe redemption, and work for the War office and Air ministry. It examines documents and maps relating to administrative and other boundaries for other ministries. The largest scale maps are the cadastral maps on the scales of 1/2,500 and 1/10,560, *i.e.* the 25-in. and 6-in. maps, and the 5 ft. and 10 ft. to the mile maps. The 6-in. map is a reduction of the 25-in.

The maps on the scales of 1/633,360, 1/126,720 and 1/253,440, *i.e.* the 1-in., $\frac{1}{2}$ -in., and $\frac{1}{4}$ -in. to the m. maps respectively, may be termed topographical maps. They show the natural features of the country, as well as towns and villages, railways, roads, canals, bridges, telegraph lines, etc. Unlike the cadastral maps, they do not show the property boundaries. The best known is the 1-in. map, the standard British topographical map. It is issued in three forms, of which that printed in colour and showing relief by means of contours and hachures is perhaps the best example of a British ordnance map. The smallest scale maps are the 1/633,600 and 1/1,000,000.

Ordovices. Celtic tribe inhabiting a large part of N. Wales at the time of the Roman occupation of Britain and subdued by Agricola in the 1st century A.D.

Ordovician. Name given to the geological period following the Cambrian and preceding the Silurian. One of the lower Palaeozoic systems, it lasted from about 400 million to 350 million years ago. It was named after the ancient British tribe of Ordovices who inhabited the Welsh borderland, because Ordovician rocks occur in Wales, as also in the Lake District, S.W. Scotland, and the S. edge of the Highlands. They are mainly grits, greywackes, shales, limestones, and volcanics which filled a subsiding trough trending N.E.—S.W. In Shropshire sandy types which were indicative of shallow water were deposited near the edge of the trough.

The period is divided into the following rock-series, in ascending order: (1) Skiddavian or Arenig; (2) Llanvirnian; (3) Llandellian;

(4) Caradocian; (5) Ashgillian. These last two used to be grouped together as Bala. Each series is subdivided into two or three zones based on their fossil graptolite content. Volcanic activity was violent during this period. Starting in S.E. Carmarthenshire and Scotland during the Llanvirnian, it continued in N. Wales, the Berwyns, and Shropshire, and finished in the Lake District during the Ashgillian. Snowdonia and the Lakes owe their rugged mountains to the resistance to erosion of the massive volcanic rocks poured out or injected during this period. The Ordovician rocks were folded at the end of the Silurian. Good roofing slates were formed then, especially in the Lakes and Wales, while ores of iron, lead, zinc, copper, barytes, and graphite were deposited in these rocks. In N. America such rocks are sources of petroleum and natural gas.

Ore. That part of a geological body from which the metal or metals that it contains may be extracted profitably. Local usage has adopted many words as substitutes for ore; dirt, pay-dirt, wash, rock, mineral, etc. An ore is nearly always a mineral aggregate, consisting of valuable constituents, ore minerals, and worthless constituents or gangue (*q.v.*).

The richness or tenor of an ore is variable; the following are minimum tenors of various ores which can be profitably extracted, given reasonable prices and working and transport costs: iron, 30 p.c.; copper, 1.5 p.c., occasionally 0.5 p.c.; lead, 5–6 p.c.; zinc, 3 p.c.; silver, 15 oz. per ton; tin, 1 p.c., though less if the metal occurs in a placer deposit. *See* under the names of various metals, *e.g.* Copper Ores; also Ore Deposits.

Öre. Bronze coin of Denmark, Norway, and Sweden; the one-hundredth part of a krone (*q.v.*).

Örebro. Sixth town of Sweden, capital of the inland co. of the same name. It is a port of inland navigation at the W. end of Lake Hjälmarn, 104 m. W. of Stockholm, and exports minerals from the local iron, silver, and copper mines and the tobacco, matches, paper, boots and shoes, and machinery manufactured in the town. An important rly. junction with a connexion to Oslo, it has the chief state rly. workshops. The ancient castle, now used as a museum, is in the section of the town built on an island in the Svarta Elf river; the town hall and an old church are other buildings of note. There is a state technical college. The town

was long the place of assembly of the Swedish diet, which in 1529 made Lutheranism the state religion. Pop. 59,879. Örebro co. covers 3,560 sq. m. and has a pop. of 235,384.

Ore Deposit. A geologic body containing a valuable mineral or minerals. All the metals and many of the materials which are of service to man are obtained from mineral deposits occurring in the earth's crust. Such deposits can be grouped into two main classes, syngenetic and epigenetic.

SYNGENETIC DEPOSITS. These are formed at the same time as the enclosing rock. Magmatic segregations (*q.v.*) are one type of syngenetic deposit. Sedimentary deposits, such as bog iron ore, are another. Material is dissolved from rocks by water and carried in solution to lakes and sea where reprecipitation occurs. In this way vast masses of dolomite (calcium magnesium carbonate) have been laid down, and where iron carbonate has been precipitated in large quantity bog iron ore and the clayband and blackband ironstones occur. Saline residues are formed by the drying up of enclosed basins of salt water; the great German deposit of chlorides and sulphates of sodium, potassium, magnesium, and calcium at Stassfurt is a striking example.

It is considered that stream waters containing copper sulphate leached from the neighbouring land surface deposited their copper as sulphide in neighbouring lakes and bogs to form the copper deposits of Mansfeld, also those in Germany. A similar syngenetic theory of origin is held by some for the famous Rhodesian copper field. In these cases it is considered that certain bacteria probably assisted in the deposition. Vast phosphate deposits called guano have been formed from the skeletons of fish and phosphate-bearing bird droppings. Coal is a sedimentary deposit.

Residual deposits, including alluvial or placer deposits, are of similar type. The tropical weathering of aluminous rocks, often igneous but not necessarily so, may give rise to deposits of bauxite (hydrated aluminium oxide) by the removal of the more soluble constituents. Often such deposits contain iron hydroxides and are called laterite. Alluvial deposits of gold and tin are formed by the removal of the lighter minerals during erosion, the heavy gold and tin tending to remain behind.

EPIGENETIC DEPOSITS. These are formed later than the enclosing rock by deposition from mineral-bearing solutions, the ore-fluid, usually in fissures in the host rock. The mineral veins or lodes so formed are of great length and depth compared with their width.

Faults and shear-zones are common kinds of fracture in which veins occur; joints and solution cavities also provide favourable channels for the ore-fluid. The vein-minerals may be deposited in open fissures or they may grow by replacement of the wall-rock. Replacement, or metasomatic, ore-bodies are not always localised along fissures, but may form huge, irregular masses replacing the country rock.

Rock Melt Deposits

Many epigenetic ores are associated with sub-acid and acid rocks, granodiorite and granite respectively. The magmas, or rock melts, from which some of these rocks have been formed, often contain appreciable quantities of volatile constituents, principally water, with boron, fluorine, sulphur, etc. Some of these constituents escape from the magma at an early stage in the consolidation of the melt, but the most important ore-formers appear to be released at a late stage when crystallisation is nearly complete. and the ore metals have been concentrated in the final fluid residuum. According to the conditions in which the volatile fractions escape and are caused to deposit the minerals they hold, so various types of ore deposit are formed.

When the magma residuum reaches a pegmatitic condition (*i.e.* a water-rich silicate melt), in certain conditions pegmatitic deposits occur. These are, characteristically, very coarsely crystalline dykes rich in feldspar and quartz, and containing rare minerals, such as cassiterite, columbite, tantalite, beryl, monazite. Such deposits are found, *e.g.* in Dakota, U.S.A., and in central Nigeria.

The earliest solutions sometimes appear to be characterised by a high content of tin, tungsten, boron, and fluorine, and the fact that tin and tungsten (and many other metals) form volatile fluorides has led many authorities to presume that these solutions were gaseous; such solutions are termed pneumatolytic. The tin mineralisations of Cornwall, Nigeria, Bolivia, and Malaya are thought by some to have been formed in pneumatolytic conditions. Later solutions

are probably liquid and give rise to hydrothermal deposits (*q.v.*) classified as hypothermal, mesothermal, and epithermal, in order of decreasing temp. and pressure of formation. Generally speaking, hypothermal deposits are found near the parent intrusive rock, while epithermal deposits may be far removed from the source, in a position where temps. and pressures were lower. In this way may arise the zonal arrangement of ores found in certain districts, notably Cornwall, where, passing from granite to cooler rock, a tin zone is succeeded by copper, lead-zinc, and iron zones.

Certain ores are often found genetically related to certain rock-types, *e.g.* tin, tungsten, and molybdenum with granites; chromium and platinum with basic rocks; gold with a granodioritic parent; copper, lead, and zinc with granite or granodiorite. Further, ore formation is closely connected with periods of profound disturbance of the earth's crust, *i.e.* orogeny or mountain-building. This periodicity is responsible for metallogenetic epochs, or periods during which ore formation was prolific. A particular type of mineralisation may also be found throughout a well-defined, often extensive region, called a metallogenetic province: *e.g.* Portugal, France, Saxony, and Cornwall constitute one metallogenetic tin province formed during Permo-Carboniferous times.

METAMORPHISM. Mineral deposits can undergo metamorphism (*q.v.*). Hydrated iron ores, such as limonites, may be changed into haematite and magnetite, a transformation accompanied by an increase in the grade of the ore. During the emplacement of an igneous rock, adjacent rocks are often metamorphosed along the contact. Contact metamorphism is partly due to the effect of increased temp. and partly to hot emanations moving out from the igneous centre. Should these emanations be metal bearing, they may give rise to contact metamorphic or pyrometasomatic mineral deposits.

SECONDARY ENRICHMENT. Probably the most important change that ore deposits, especially copper and argentiferous lead deposits, can undergo is secondary enrichment. The outcrop of a sulphide-bearing lode is frequently leached by downward percolating waters forming a gossan (*q.v.*); the ore metals are oxidised to form soluble oxy-salts and the metal-charged solutions descend below

the zone of oxidation. Here chemical reaction takes place between the solutions and the unaltered sulphides, with the result that a new set of minerals is formed whose members are often very rich in the valuable metal of the lode. This chemical process may be responsible for a very rich and valuable ore-body even where the primary mineralisation was low-grade: e.g. the extensive "porphyry" copper deposits of the U.S.A., where the primary ore is often too poor to be worked; and the argentiferous lead-zinc ore-body at Broken Hill, N.S.W., Australia, where a high-grade primary mineralisation has through secondary enrichment become a zone of immense value near the surface. See Metasomatism; Mineral Dressing; Pegmatite; Prospecting, etc.

Bibliography. Mineral Deposits, W. Lindgren, 4th edn., 1933; Strategic Mineral Supplies, G. A. Roush, 1939; Principles of Economic Geology, W. H. Emmons, 2nd edn., 1940; Economic Mineral Deposits, A. M. Bateman, 1942.

Ore Dressing. Of this subject a full description is given under Mineral Dressing.

Oregon. Western maritime state of the U.S.A. The surface is extremely diversified. In the mountainous W., the Coast Range separates the rocky coast from the fertile valleys of the Willamette and Umpqua rivers, which are enclosed on the E. by the Cascade Range, containing many extinct volcanoes and snow-capped peaks, the highest of which is Mt. Hood, 11,934 ft. Farther E. lies an undulating prairie, scored by valleys and relieved by numerous mountains, and in the N.E. rise the Blue Mountains. The Columbia river marks most of the N. frontier, and the Snake river a large part of the E. frontier, their valleys providing an extensive tract of fertile land.

The climate of W. Oregon is generally mild and healthy, but farther E. there is a scarcity of rain, and an extremely wide range of temperature. Over a large area in the S. there is no river drainage owing to evaporation, and widespread artificial irrigation is necessary. Wheat, hay, potatoes, hops, and various fruits are produced, and the fisheries and stock-raising are valuable industries. Gold, silver, copper, and other minerals are worked, while the manufactures are chiefly associated with land products and the fisheries. Oregon ranks first among the states in the production of lumber, Oregon pine being the trade name for Douglas

fir (*q.v.*). There is a state university at Eugene, and an agricultural college at Corvallis. The length of the railways exceeds 5,200 m. The Dalles and Celilo canal enables ocean-going vessels to reach Portland, 108 m. inland, and makes the Columbia and Snake rivers navigable to 570 m. inland. A further notable development is the Bonneville power and navigation project completed 1944.

Salem is the capital, and Portland is the commercial centre. Two senators and four representatives are sent to congress. Woman suffrage was adopted in 1912. Washington and Idaho, as well as parts of Montana and Wyoming, were originally included in Oregon, the possession of which was long disputed between Great Britain and the U.S.A. It was jointly occupied 1818-46, when the frontier was fixed at 49°. The state was formed out of the territory in 1859. Area 96,981 sq. m. Pop. 1,089,684.

Oréide or **OROIDE** (Fr. *or.*, gold; Gr. *eidos*, form). Brass introduced in France as a substitute for gold in the manufacture of jewelry. Its composition is usually copper 85.5, zinc 14.5 parts, and its colour resembles real gold. It takes a fine polish, is ductile and tenacious, and can be readily stamped, rolled, or worked.

O'Reilly, JOHN BOYLE (1844-90). Irish-American poet and journalist. Born at Dowth Castle, Meath, June 28, 1844, he joined the Fenian society, and in 1863 enlisted in the British army in order to induce the soldiers to revolt. He was tried for high treason in 1866, and sentenced to be shot, but the sentence was commuted to 20 years' penal servitude in Australia. Having escaped to America in 1869, he settled at Boston, where he became editor of *The Pilot*, and published several works in verse and prose. He died at Hull, Mass., Aug. 10, 1890.

Orel. Town of Central Russia, in the region of Kursk. It stands at the junction of the Oka and Orlik, 170 m. N.W. of Voronezh. It owes its importance largely to the facts that it is also at the point where four lines of rly. meet, and that it is in the centre of a highly fertile agricultural area. Pop. 110,567.

During the Second Great War it was the scene of heavy fighting and changed hands several times before being occupied by German troops, Oct. 7, 1941. Converted into an immensely powerful stronghold by the Germans, it was recaptured by the Russians, Aug. 5, 1943,

only after 24 hours' severe street fighting. *Pron.* Or-el'.

Orense. Inland prov. of N.W. Spain, bounded S. and W. by Portugal. It is traversed by the Miño, and watered by the Limia and smaller streams. Almost wholly mountainous, its climate is generally mild, but cold and damp in the hills. In the valleys fruits, including figs, oranges, almonds, and olives, are grown. In the uplands timber trees abound, walnut and chestnut predominating. Some iron is mined, and fine cattle are reared on the pastures. Orense formed part of the old kingdom of Galicia. Area, 2,694 sq. m. Pop. 477,030.

Orense (anc. *Aurium*). City of Spain, capital of the prov. of Orense. It stands on the Miño river, 45 m. N.E. of Vigo on the Monforte-Tuy rly. The river is here spanned by a bridge, 1,320 ft. long and 135 ft. high, built by Bishop Lorenzo in 1230. The Gothic cathedral, dating from 1220, has been damaged by earthquake. At the foot of the hill on which Orense stands are the warm sulphur springs of Las Burgas, and in the vicinity are the baths of Caldas de Orense, known to the Romans. Its bishopric was founded in the 5th century. The place is noted for its hams, and it manufactures chocolate, textiles, and leather. Iron founding and flour and saw milling are other industries. Pop. 17,800.

Orestes. In Greek legend, son of Agamemnon and Clytemnestra. When his father was murdered, Orestes was saved from a like fate by his sister, Electra, who sent him to Phocis, where he became an intimate friend of the king's son, Pylades. Having slain his father's murderers, he was pursued by the Furies, until his acquittal by the court of the Areopagus, at Athens. According to another legend, he went for purification accompanied by his friend, Pylades, to the country of the Tauri (Crimea) to fetch from there a statue of the goddess Artemis, returning with his sister, Iphigenia, to Argos, where Orestes reigned over his father's kingdom at Mycenae. See Agamemnon; Areopagus; Choephori; Electra; Eumenides; Iphigenia.

Orfila, MATHIEU JOSEPH BONAVENTURE (1787-1853). Franco-Spanish chemist. Born at Mahon in Minorca, April 24, 1787, he studied medicine at Valencia and Barcelona universities, then settled in Paris where in 1823 he became professor of chemistry, and in 1830 dean of the faculty of medicine.

His great work *Toxicologie Générale*, 1813, laid the foundations of the science of toxicology. He died Mar. 12, 1863.

Orford. Town of Suffolk, England. It stands at the confluence of the Alde and the Ore, famous for its oysters. It is 18 m. E.N.E. of Ipswich, and formerly a town of importance, having a market and sending two members to parliament from 1295 to 1832. The church of S. Bartholomew, a fine example of Early English architecture, has Norman work in the chancel ruins. Orford Castle, a Norman stronghold notable for its keep, forms a polygon of 18 sides. Pop. est. 1,000.

Orford, EARL OF. British title borne in turn by the families of Russell and Walpole. In 1697 the seaman, Edward Russell, was created earl of Orford, but the title became extinct on his death in 1727. In 1742 the statesman, Sir Robert Walpole, was made earl of Orford. The title passed to his son and grandson, and, when the latter died without sons in 1791, to Sir Robert's youngest son, the famous Horace. It became extinct on his death in 1797. In 1806 his cousin Horatio, Baron Walpole, was created earl of Orford, and the title is still held by his descendant. Houghton Hall and the estates in Norfolk passed away from the title when Horace Walpole died. The earl's seat is Wolferton Park, Norwich. See Walpole, Horace; Walpole, Sir R.

Orford, EDWARD RUSSELL, EARL OF (1653-1727). Nephew of William, 1st duke of Bedford, he entered the navy and actively supported William of Orange, who made him admiral and treasurer of the navy, 1689. Although intriguing with James Stuart, he engaged the French fleet and gained a signal victory at the battle of La Hogue (*q.v.*), May 19, 1692. Suspicious of his loyalty led to his dismissal, but, reinstated in 1693, he commanded the Mediterranean fleet, 1694-95, and was first lord of the admiralty, 1694-99, 1709-10, and 1714-17. He was made earl of Orford, 1697. Died Nov. 26, 1727.

Orford Process. A metallurgical smelting process used in the extraction of nickel from its ores. The Canadian ores consist of mixed nickel and copper sulphides, and this method of separating the two sulphides depends upon the greater solubility of copper sulphide in sodium sulphide. After melting with sodium sulphate and coke, the product is cast and it separates into two layers, the

"tops" being treated for recovery of copper, while the "bottoms" are used for the production of pure nickel. See Nickel.

Organ. Largest and most powerful of musical instruments. It has the advantage of many tone qualities, but the disadvantages of an unsensitive touch, and the fact that all expression is obtained from it by mechanical means. It has anything from one to five keyboards or manuals, a pedal keyboard, and numbers of stops, in large organs amounting to several hundred. A few organs of very exceptional size, to be found in the U.S.A., have as many as seven manuals. The stops are controlled by knobs arranged on either side of the manuals or by stop-keys generally arranged over the manuals, and there are various accessories to assist in the manipulation of the stops.

A speaking-stop consists of a pipe of the same timbre for every note on the keyboard, 61 pipes on an organ of full compass. The pitch of the pedal keyboard is an octave below that of the manuals. The pedal keys are of wood and very large; the compass is from C₀C to g (32 notes), sounding an octave lower than the lowest note on the keyboards. There are other stops called couplers, controlling appliances for coupling the manuals to the pedals and to each other, so that keys depressed on one keyboard (or pedal-board) sound the corresponding notes or octaves on that to which they are coupled. The length of the pipe governs the pitch and its quality. The pipe sounding C₀ is approx. 8 ft. long, and a stop sounding the notes as printed is known as an 8 ft. stop. Those of 16 ft. sound an octave below what is printed; those of 4 ft. an octave above. The 8 ft. stops give the instrument its breadth and dignity; they outnumber those of any other single pitch. 16 ft. stops are usually found on the pedal keyboard; they fulfil much the same functions as the double basses in the orchestra. 32 ft. stops are included in large organs and in many comparatively small contemporary ones, in which, however, they are included by a method that is compact and convenient. The 4 ft. and 2 ft. stops and others of high pitches (mixtures) add brilliance.

VARIETIES OF PIPES. Pipes are divided into two principal groups, flues and reeds. The flues (diapason, flutes, etc.), made of wood or metal, sound on the same principle as a tin whistle. The front pipes of

an organ belong to this group. The air in a reed pipe, usually of metal, is put in vibration by wind forced between a semi-cylindrical tube, and a brass tongue covering its open side; this is placed in the foot of the pipe. A flue pipe with its upper end closed by a stopper sounds an octave lower than an open pipe of the same length. Harmonic pipes, reed or flue, are so treated that they sound their first harmonic, that is, an octave higher than an ordinary pipe of the same length.

Each manual has a separate function. The most important, the great organ, contains the loud stops of all pitches. The pipes of the swell organ, so called because they are always enclosed in a wooden box, one side of which consists of Venetian shutters which open and close by means of a pedal, are generally not so loud as those of the great organ. In many contemporary organs the whole of the pipes are enclosed in such a box so that every single pipe is expressive by means of the swell-shutter mechanism. The choir organ consists of soft and delicate stops. If there is a 4th manual it is usually called solo organ and contains stops (as its name implies) of distinctive solo quality such as flute, oboe, clarinet, etc. Where there is a 5th manual, it is generally the echo organ and contains very quiet ethereal tone stops, or the bombard organ containing extremely powerful reed stops comparable with the brass in the orchestra. All contemporary organs are blown by an electric motor driving a rotary fan.

History of the Organ

In the 11th century already men were acquainted with the art of manipulating the opening of the lower end of the pipe in order to alter its power and quality. There were various crude mechanical methods of opening a valve and allowing wind to pass into the pipes. It was not until the 16th century that the present system of stop control was initiated. Sliders having holes corresponding with as many pipes as there were in the stop concerned were arranged so that the holes would coincide with the opening of the pipes when the stop was "on." Draw-knobs were placed at the sides of the manuals, and when these were drawn levers moved the sliders until the holes came under the pipes. After the invention of the swell by Jordan in 1712 no important innovation is found until the 19th century. The invention of composition pedals by Bishop in

1809 revolutionised stop control. These are iron pedals placed above the pedal keyboard. When depressed they draw certain groups of stops and take in others, each pedal having a fixed combination of stops.

The size to which organs had grown, and the demand for the performance of rapid and difficult passages, made it necessary to find some improvement upon the heavy and noisy tracker (mechanical) key mechanism. This was first achieved by pneumatic lever action discovered by Barker in 1832. The keys, on being depressed, operated valves admitting compressed air from a wind reservoir to V-shaped motor bellows. One side of these was fixed, the other expanded, and the movable side was attached to the tracker action. Tubular pneumatic action eventually overcame the difficulties of slowness and noise. In this action the key operates a valve admitting compressed air to tubes which transmit the power to other valves moving the pallets. A combination of electric and pneumatic (electro-pneumatic) action was used subsequently for many years until superseded by direct electric action, in which the stop control was an electric switch operating an electro-magnet at the chest containing the wind supply to the pipes. When the magnet was energised the pipe was suddenly flushed with wind by the opening of the pallet. This action was both reliable and rapid.

Thumb pistons placed just below the manuals have the same functions as composition pedals, and are often used instead of them. These pistons, controlling groups of stops, can in many organs have their combination changed at the will of the organist sitting at the console. Most contemporary organs have a crescendo pedal which brings on the stops from softest to loudest as it is gradually depressed; and by the voicing of pipes and their relative scale many beautiful and varied tone colours have been evolved.

Typical of the church organ is its broad diapason tone, the natural kind of tone with which one associates an organ. The whole of the instrument's tonal build-up is based on a "chorus" of diapasons in various pitches, and other tonal qualities in the organ are subservient to this glorious sound.

The concert organ must contain a satisfactory diapason chorus, but it must also possess a variety of tone colours particularly useful for

solo effects such as are found in the orchestra—flute, oboe, clarinet, trumpet, etc.

The theatre organ is a series of extreme solo tone-colours welded together into a pleasant musical whole. One of the most important stops in the theatre organ is the tibia, a large scale flute nearly always used with a tremulant, by means of which the wind supply can be tremulously supplied to the pipes, giving the kind of effect that a violinist obtains from a vibrato on his string. The theatre organ also contains many orchestral-toned stops imitating strings, wood-wind, and brass, and nearly always a vox humana, a reed stop imitative of the human voice. The theatre organ also possesses a number of percussion instruments such as drums, cymbals, xylophone, glockenspiel, and under the hands of an expert can be made to give a realistic and musical representation of light orchestral music.

The basic structure of all three instruments is the same, the variety being obtained by the voicing of the pipes.

From about 1900 a method of organ building on what is called the extension principle was developed by Compton. In organs built in this way the pipes available are made to do maximum duty, and an organ that is both compact and relatively inexpensive can be given great tonal resources. Ingenious and reliable direct electric action contributes to the voicing and regulation of tonal resources of such an instrument. See diagram facing p. 6221.

Leslie Spurling

Organic Chemistry. Term applied to the branch of chemistry dealing with the products of animal and vegetable organisms. The term has become to some extent restricted to the study of carbon and hydrogen compounds and their derivatives. See Carbon; Chemistry; Hydrocarbon.

Organists, ROYAL COLLEGE OF. London institution. Founded in 1864 to further the interests of the profession of organist, and of church music generally, it conducts examinations in organ playing, the theory of music, and choir

training. Upon the results of the organ playing and theory examinations the diplomas of Associate and Fellow are awarded. For many years the home of the college was in Hart Street, Bloomsbury, but in 1904 it moved to the present building in Kensington Gore. This was erected in 1876 for the National Training School for Music and was used by the Royal College of Music 1882-94. The Royal College of Organists received a royal charter in 1893.

Organizer. Biological term. In the developing egg of many forms it has been found that the dorsal part of the rim of the blastopore when it is implanted into another egg, will cause the host egg to produce a supernumerary embryo. The tissue donated organizes the host. This observation was made by Spemann. It has subsequently been found that the organizer works by producing substances which affect the metabolism of the host and evoke from it responses which constitute the formation of this extra embryo. See Evocator; Embryology.

Orgelev or ORGEV. Town of Moldavia S.S.R. It is situated 25 m. N. of Kishinev, on the Reut. The chief industries have been the making of tobacco, candles, and bricks, tanning, and dyeing. Its limestone quarries are famous. Part of the town is built over the site of a Dacian fortress. Pop. 18,000.

Oriel (late Lat. *oriolum*, small room, recess). In architecture, term usually applied to a bay window corbelled out from the wall of an upper floor, or over a porch, but formerly extended to a bay window on the ground floor. A conspicuous feature of Tudor architecture, it became common about the middle of the 15th century. See Gothic Architecture.

Oriel College. College of Oxford University. Founded in 1326 by Adam de Brome, a servant of Edward II, and dedicated to S. Mary the Virgin, it was not called Oriel until a little later, a building called La Oriole having previously stood on the site. The older



Oriel window. Example in Nuremberg, dating from 1361

buildings, including the beautiful front quadrangle, face Oriel Street, while newer ones face High Street.



Oriel College arms the Oxford Movement. Of later members one of the most distinguished is Cecil Rhodes, who left a large sum of money to the college and provided funds for the new buildings. Other famous members have included Sir W. Raleigh, Bishop Butler, Gilbert White, and Thomas Hughes. See Oxford Movement. Consult Oriel College, D. W. Rannie, 1900.

Orient (Lat. *oriens*, rising). Region where the sun rises, i.e. the east. It is used, more or less poetically, as a synonym for the eastern parts of the world, e.g. China, Japan, etc., and their inhabitants are sometimes called Orientals. An Orientalist is one who is acquainted with the learning of the East. In the same way the western parts of the world are sometimes called the Occident.

Oriental and African Studies, SCHOOL OF. London educational institution. Founded in 1916, it is a recognized school of the university of London. The buildings are situated on the university site in Bloomsbury. The academic work of the School is organized in eight departments, viz. India and Ceylon; South East Asia and the Islands; the Far East; the Near and Middle East; Africa; Phonetics and Linguistics; History; and Laws. Instruction is given in all the principal languages and in the histories, religions, and cultures of Asia and Africa. The school provides the language training for the colonial administrative service.

Orientation. Primarily, the turning towards the East, or Orient. In architecture, the term is applied to the setting of a building with reference to the compass points. The main entrance to Greek temples faced E. so that the level rays of the early sun lit up the image of the

divinity. Early Christian basilicas were similarly orientated, but when a change of ritual involved the turning of priest and congregation to the E. the orientation was reversed, and from the 6th century most churches were built with the altar at the E. end and the main doors at the W.

In surveying, orientation means the direction of an object according to the points of the compass. The term is also used in building when siting structures in relation to the sun so that the maximum sunlight will penetrate to the interior. The angle of orienta-



Oriel College, Oxford. Front quadrangle of the old buildings, showing hall (left) and chapel (right)

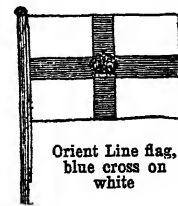
tion is a term in ballistics to describe the angle which the vertical plane, including the axis of the projectile, makes with the vertical plane holding the tangent to the trajectory.

In biology, orientation is the adjustment of an organism or its parts to its environment.

Oriente. Largest of the six provinces of Cuba, with an area of 14,211 sq. m. In the S. it is mountainous and heavily wooded. Mount Pico Turquino (8,400 ft.), the highest mountain in the island, is in this province. In the N. there is a flourishing fruit industry served by a group of ports, with steamer connexion with New York. Santiago, the capital, and Guantanamo are situated on great landlocked harbours surrounded by mountains. Santiago is 600 m. from Havana, with which it is connected by the Cuba rly. and also by a good motor road. Pop. 1,142,629.

Oriente. Region of Ecuador. Formerly a province, it was divided in 1925 into the two provinces of Napo Pastaza and Santiago Zamora. It includes territory on the Peruvian frontier, the exact demarcation of which has long been in dispute. More than half the region is uninhabited. Area 219,095 sq. m. Pop. est. 295,000

Orient Line. British steamship company. Founded in 1877 to provide a service between London



Orient Line flag, blue cross on white

and Australia, it became the Orient Steam Navigation Co. in 1878. It now has services from London (Tilbury Dock) to Port Said, Aden, Colombo, Freemantle, Adelaide, Melbourne, Sydney, and Brisbane. Its head offices are 7 and 11, Bishopsgate, London, E.C. The names of its steamers all begin with O. There were eight in 1939, but four were lost in the Second Great War, soon after which two 31,000-ton vessels were built.

Oriflamme (Fr., golden-flame). Sacred standard of the French kings. It was kept by ecclesiastics, and was supposed to have been the cloak of a saint, some say the blue mantle of St. Martin; according to others, it was red. It was destroyed in battle. The second oriflamme, kept at the abbey of St. Denis, was red with yellow flames, and had streamers. It was raised by the French at Agincourt, its last appearance. See Flag.



Oriflamme. 5-pointed French royal standard

Origen or **ORIGENES** (c.185-254). Greek father of the Church. Born at Alexandria, son of Leonidas, a Christian martyr, he was educated by Clement and Pantaenus. He taught in the catechetical school at Alexandria, where he founded a theological school, but was banished and degraded to the status of a layman. Teaching at Caesarea, he was imprisoned during the Decian persecution, 250, and died at Caesarea or Tyre. A voluminous and learned writer, whose orthodoxy was questioned, he wrote, in Hexapla, a polyglot of the O.T., the first textual criticism of the Bible. Origen also wrote commentaries and other exegetical works, a defence of Christianity, Against Celsus, and aimed at adapting Greek philosophy to the needs of Christian theology. He ranks among the early Fathers.

Original Seceders. Body of Scottish Presbyterians formed in 1842 from the remnants, or Auld

Lights, of both burgher and anti-burgher parties of the Secession Synod unabsorbed into the Church of Scotland or United Presbyterians. The Original Seceders opposed the use of instrumental music in public worship, and favoured national establishments of religion based on the Solemn League and Covenant. See Auld Lights; Church of Scotland.

Original Sin. Term for the mystical Christian doctrine that man inherits sin by descent from Adam. It was defined by the council of Trent, and is regarded as being implied in Ps. 51, v. 7; Rom. 5, vv. 1-2; and, combined with the doctrine of divine grace, in 1 Cor. 15, vv. 21-22. See Atonement; Fall, The; Free Will; Grace.

Originating Summons. In English legal procedure, a summons returnable before a master or a judge, when no writ has been issued. An inexpensive proceeding, it is used in many cases relating to trusts and other matters where a legal decision is necessary, though the facts are not in dispute. Thus, if executors or trustees are in doubt about the construction of a claim in a will or settlement, they ask the court to interpret it by originating summons.

Origin of Species, THE. Book by Charles Darwin published Nov. 24, 1859, with the full title *On the Origin of Species by the Means of Natural Selection*. The theory was first clearly conceived by him in 1839. He was engaged on an extensive presentation of the subject, when Alfred Russel Wallace (*q.v.*) sent him an essay showing that he also had independently reached much the same conclusions. This led Darwin to publish an abstract of his larger work as originally planned. See Darwin; Darwinism.

Orihuela. Town of Spain, in Alicante prov. Situated on a plain called the Garden of Spain, the town is on the Segura river and is backed by a rocky ridge, the Cerro de Oro, 15 m. by rly. N.E. of Murcia. The bishopric dates from 1265. There are tanneries, corn and oil mills, and textile factories. This was the Orcelis of the Goths, who here made a last stand under Theodorici. In 713 it was captured by the Moors, who called it Origiuela, and in 1265 recovered by the Christians. Pop. 42,500.

Orillia. Town and holiday resort of Ontario, Canada. It stands on Lake Couchiching, 86 m. N. of Toronto, and is served by C.N.R. and C.P.R. Steamers go from here to places on Lake Simcoe. The scene of Leacock's *Sunshine*

Sketches of a Little Town, Orillia is also a manufacturing centre. Pop. 9,798.

Orinoco. River of S. America. It rises in the Sierra Parima in a mountain gorge which divides Brazil from Venezuela. Starting towards the N.W., it flows round these mts. in a great curve, thence E. to the Atlantic Ocean. S. of Mt. Duida the river gives off a strong flowing stream, the Casiquiare, which joins the Rio Negro and thus connects the Orinoco with the Amazon. The right-bank tributaries, all from the Sierra Parima, are the Ventuari, Caura, and Caroni; those of the left bank, Guaviare, Meta, and Apure, flow across the llanos from the Colombian Andes.

Between the mouths of the Guaviare and the Meta the main stream makes the falls of Maipures and Atures 36 m. apart, which prevent the passage of boats between the navigable stretches above and below them. About 160 m. from the sea the Orinoco delta begins, upwards of 50 channels distributing its waters into the Gulf of Paria or direct to the Atlantic Ocean. Ocean steamers reach Ciudad Bolivar 200 m. from the ocean, where the river is tidal. Its length is 1,600 m.

Oriole (*Oriolidae*). Family of passerine birds, natives of the Old World. About the size of a thrush, they are richly coloured with yellow, olive green, and black; have strong bills, short legs, and long wings, and construct hammock-like nests, which are suspended between two forking branches. The golden oriole (*Oriolus oriolus*) of Asia, S. Europe, and N. Africa is a regular visitor to Great Britain on migration, and would probably nest here but for the fact that it is usually shot on sight. The cock is golden yellow with the exception of the wings and the middle of the tail, which are black. In the hen the upper parts are yellow-olive and the pale under parts are streaked with brown. Mainly insectivorous, the birds consume berries in the autumn. The so-called orioles of the U.S.A. are not related, but belong to the family Icteridae.

Orion. In Greek mythology, a famous giant and hunter. Falling in love with Meropë, daughter of

Oenopion, king of Chios, he obtained from her father the promise of her hand, provided he cleared the island of wild animals, which was supposed to be an impossible task. Orion duly performed it; but Oenopion made him drunk and put out his eyes as he lay asleep. Having recovered his sight by following the advice of an oracle, Orion took vengeance upon Oenopion. He was slain by Artemis with her arrows for attempting to violate her; or was killed by a scorpion bite as punishment for boasting about his prowess as a hunter. After his death Orion was placed among the stars.

Orion. In astronomy, one of the constellations. Lying on the celestial equator, S.E. of Taurus, it contains the three famous stars, Rigel, Betelgeux, and Bellatrix. The constellation as a whole is one of the brightest in the sky. It contains a large number of variable stars and the great Orion nebula.

Orissa. A state of India. It includes the area where the predominant language is Oriya, and has area 32,198 sq. m. and pop. (1950 est.) 14,410,000. It contains the S. part of the Chota Nagpur plateau, and includes the lower valley and the delta of the Mahanadi and the greater portion of the Brahmani tributary. All the coast of Orissa is in the division of Cuttack, between Madras on the

S. and Bengal on the N. Cuttack Chowdwar is the capital. Orissa was conquered by the British in 1803. Long attached administratively to Bihar, it was made an autonomous province in 1936 and a state in 1950. Hindus are in a large majority. Rice growing and milling employs 80 p.c. of the pop. Silver filigree work is famous.

Consult Orissa in the Making, B. C. Mazumdar, 1925.

Oristano. City of Italy, in Sardinia. Almost in the middle of the Gulf of Oristano, on the W. coast, it has rly. and steamer connexion with the other chief towns of the island, has important potteries, and trades in wheat, wine, and fish.

Oristano, GULF OF. Arm of the Mediterranean Sea. It is almost in the middle of the W. coast of Sardinia, 10 m. long and 5 m. wide, and receives the Oristano river, which has a course of 80 m. It forms a harbour for Oristano city.



Oriole. Specimen of the golden oriole

Orizaba. City of Mexico, in the state of Vera Cruz. It is 70 m. S.W. of Vera Cruz, on the rly. to Mexico City, with which there is also road and air connexion. Situated in a fertile valley, more than 4,000 ft. alt., it is a centre of the sugar trade, and produces tobacco. Its textile factories and breweries are among the best equipped in Mexico. Pop. 47,542.

Orizaba, PICO DE. Highest peak in Mexico. Known to the Aztecs as Citlaltepētl (star mountain), it is situated 25 m. N. of the city of Orizaba, and rises to a height of 17,400 ft. An extinct volcano, its last noteworthy eruption occurred in 1566.

Orjonikidze. Name of two towns in the U.S.S.R., so named in honour of the politician Orjonikidze (v.i.). One, in the Ukrainian S.S.R., has a pop. of 88,246. The other, in the N. Ossetian A.S.S.R., lies on the upper reaches of the river Terek on the N. slopes of the Caucasus Mts. Pop. 127,172. At its approach the Germans suffered Nov. 19, 1942, a decisive defeat, being forced back with severe losses (5,000 killed) on Nalchick. This was the turning point of the war in the Caucasus, and saved the Grozny oil field from falling into enemy hands.

Orjonikidze, GREGORI (d. 1937). Russian politician and administrator. Born in Georgia, he was early prominent in revolutionary activity, and in 1908 was exiled to Siberia. The following year he reached Paris, later returning to Russia to assist Lenin. Again exiled to Siberia, he was liberated during the Bolshevik revolution of 1917 and joined the Red army as director of operations on the W. and S. Caucasian fronts. In 1930 he was commissar of heavy industries in connexion with the first five-year plan. He died at Moscow on Feb. 21, 1937.

Orkhon Inscriptions. Ancient stone records S. of Lake Baikal in the Orkhon valley, Outer Mongolia. Discovered in 1889, the principal monument is four-sided, and bears tribal records in Chinese and old Turkic, incised in 733 in an alphabet derived from an Aramaic source. A later inscription, dated 805, was made under Uigur direction. These and others prove that the Turkic and Uiguric peoples of that time were predatory mounted nomads, having no settled town life, but with some cultural elements absorbed from the adjacent populations. The inscriptions have an important bearing on Finno-Ugrian origins. Although

presenting some resemblances to runes, they have no Scandinavian relationships. See Rune.

Orkney Causeway. Barriers constructed early in the First Great War between the Orkney Islands, which, combined with block-ships, closed the channels into Scapa Flow, making the anchorage safe against submarines. In 1943 these causeways were surfaced and within a year had become first-rate traffic roads linking the islands. They were constructed mainly of concrete blocks, but were not designed as permanent structures and soon began to sink into the sea.

Orkney Islands. Group of islands off the N. coast of Scotland. Pentland Firth, 6 m. wide, divides them from the mainland. The total area is 376 sq. m., and they form a county of Scotland. Islands and islets number altogether about 90, but only 30 are inhabited. Pomona, or Mainland, is the largest. Others are North and South Ronaldsay, Stronsay, Hoy, Flotta, Rousay, Westray, Sanday, Shapinsay, Burray, and Eday. Kirkwall on Pomona is the capital and largest place. Stromness is the only other town. With the Shetland Islands the Orkneys send one member to parliament. Pop., est. 21,400.

The surface is mainly flat, except on the west coast of the larger islands and in Hoy, although there are hills in Pomona. Lochs Harry and Stenness, both in Pomona, are the largest of a number of lakes. The chief industries are agriculture and fishing. The former includes the raising of oats and barley, and the rearing of cattle, sheep, and pigs. The cultivators of the land are mainly crofters. Scapa Flow (q.v.) is between Pomona and Hoy.

The Orkneys were known in early times as the Orcaades. In the 9th century they were conquered by the Norsemen, and made dependencies of Norway and Denmark. In 1468, when Christian I of Denmark married his daughter to James III of Scotland, he handed over the islands to Scotland as security for a dowry, but this was not paid, and the islands became definitely Scottish. On several are remains left by the Picts.

The use of Scapa Flow by the fleet made the Orkneys of great importance during both Great



Orkney Islands. Map of the island group off the north coast of Scotland

Wars. In the Second, A.A. defences were installed, and flying boats of Coastal Command were based there. The channels into Scapa Flow were controlled by the previously erected Orkney Causeway (q.v.) and by the sinking of block-ships against submarines.

Orlando. Ital. form of the name Roland (q.v.). It is that of the leading male character in Shakespeare's *As You Like It*. Orlando, youngest of three sons of Sir Rowland de Boys, driven from home by his brother, meets Rosalind, falls in love, and marries her.

Orlando, VITTORIO EMMANUELE (b. 1860). Italian statesman. Born at Palermo, May 19, 1860, he became professor of constitutional law there in 1883. Entering parliament in 1898, he was minister of education 1903-05, of justice 1907-09 and 1914-16, and then of the interior, 1916. Prime minister in 1917, he acted virtually as dictator in Italy. At the peace conference of 1919, he, Lloyd George, Clemenceau, and Wilson were known as the Big Four. Orlando withdrew from the conference over the question of Fiume, and on his decision to compromise, his ministry fell in 1919. He was ambassador to Brazil in 1920, and on his return at first supported fascism, but turning against it in 1925, resigned from parliament. In 1943 he again took his seat in the chamber, but retired from politics in 1947 to mark his opposition to the peace treaty.

Orle (late Lat. *orlum*, small border). In heraldry, a border round a shield, but not touching the edges. It is one of the sub-ordinaries. Small charges may be borne in orle, i.e. as a border.

Orléanais. One of the provs. into which France was divided before the Revolution. It lay



Orkney arms

around the city of Orléans, on both banks of the Loire. The Pagus Aurelianensis of the Romans, it was from the earliest times part of the domain of the kings of France.

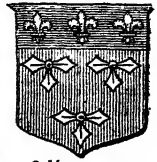
Orléanists. Name of the political party which supports the claim of the family of Orléans (*q.v.*) to the throne of France. The supporters of Philippe d'Orléans (1674–1723), of Philippe Égalité, and of Louis Philippe represent its earlier phases. Under the Third Republic it fused with the Legitimist party in 1873, the comte de Chambord being recognized as Henri V. The Orléanists suffered a setback in popular support by the papal encyclical of 1892, which urged French Catholics to rally to their existing political constitution. On the death of Louis Philippe Robert, duke of Orléans (1869–1926), his cousin Jean, duke of Guise (1874–1940),

became heir to the claim. He was succeeded by his son, the count of Paris (b. 1908).

Orléans. Island of Quebec, Canada. It is in the St. Lawrence river, 30 m. N.E. of the city of Quebec. It covers 69 sq. m., and is visited by pleasure seekers.

Orléans. French city. Capital of the department of Loiret, it stands on the right bank of the Loire at its northernmost point and on the Orléans canal. It is a rly. junction for Paris (60 m. N.), the

Second Great War. The 15th century church of S. Aignan has a 9th century crypt. The hôtel de ville (1442) is now a museum, as are dwellings connected with Agnes Sorel and Diana of Poitiers, but the Joan of Arc museum was destroyed in the Second Great War. Earlier fortifications gave way to beautiful boulevards. A musical academy and a botanical garden are among the city's amenities.



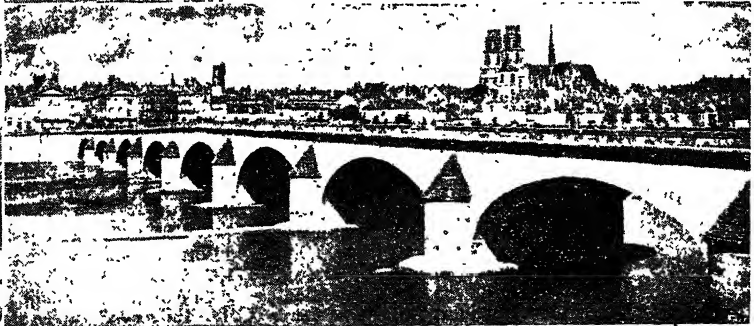
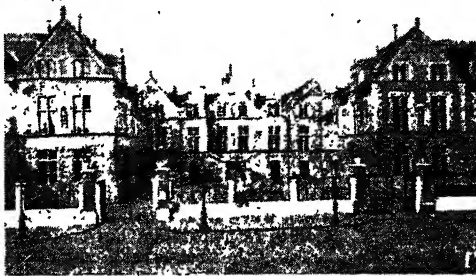
Orléans arms

Orléans has textile, engineering, shoe making, glass, and electrical industries, besides factories for food-stuffs and preserves. Its place in French esteem far exceeds its rank by

Loire ports Nantes and St. Nazaire, and Bordeaux. One of France's oldest cities, before Caesar's time it was the centre of the Celts of Gaul, deriving its later name from the Roman emperor Aurelian. The outstanding building is the cathedral of the Holy Cross, reconstructed under Henry IV after its destruction by Calvinists in 1562, the only Gothic cathedral built in Europe after the Middle Ages; its N. tower was damaged by shell fire in the

pop., which is 70,240. This is due to its historical rôle; it saw the first national council of the Franks in 511, had a university from 1309 to 1790, was capital of the Bourbon line of Orléans from 1344, and above all was liberated from the English by Joan of Arc in 1429 (*see next entry*). Her memory is preserved in an equestrian statue and the Croix de la Pucelle, a cross on the left bank of the Loire. The edict of Orléans, 1561, first gave liberty of worship to the Huguenots, and here two years later Francis of Guise was assassinated.

In the Franco-Prussian War Orléans fell to the Prussians Oct. 11. 1870. During the Second Great War the Germans took it again in June 17, 1940, and it remained in the occupied zone of France until freed by armoured columns of the U.S. 3rd army, Aug. 17, 1944.



Orléans, France. 1. Hôtel de Ville, built in 1442. 2. West front of the 17th century cathedral of Ste. Croix. 3. House of Agnes Sorel, a favourite of Charles VII. 4. General view from the left bank of the Loire

Orléans, SIEGE OF. English failure during the Hundred Years' War. The English were rapidly conquering France, and on Oct. 12, 1428, their force, about 5,000 strong, under the earl of Salisbury, appeared before Orléans. An assault was attempted, but it was a failure, and Salisbury having been killed, a blockade was decided upon. The besiegers, however, were not numerous enough to encircle the city completely, and the siege dragged on until April. By then Joan of Arc appeared, and having entered Orléans, she led the garrison in a series of attacks on the English positions. One after another these were taken, until on May 4, 1429, the besiegers, under Suffolk, were forced to abandon the enterprise.

Orléans, HOUSE OF. Branch of the house of Bourbon (q.v.). The first duke of Orléans was a younger son of Philip VI, and the second was Louis, son of Charles V. The poet, Charles of Orléans (v.i.), succeeded the latter, and his son became king as Louis XII in 1498. The title then lapsed, to be revived in 1626, when Gaston, son of Henry IV, was made duke. The next holder was Philip, son of Louis XIII, whose descendants still hold the title, although it is not officially recognized in France. Philip's son was the regent Orléans, and from him it passed to Louis Philippe, who became king in 1830. The king's son was Ferdinand, duke of Orléans, and the latter's grandson was Louis Philippe, duke of Orléans. Louis' father had claimed, on the death of the count of Chambord in 1883, the headship of the Bourbons, and to this claim the son succeeded in 1894. He died without issue in 1926, when a cousin, Jean, duke of Guise, became head of the house and pretender to the kingship of France. On his death in Morocco, Aug. 25, 1940, he was succeeded by his son Henry, count of Paris. See Legitimists. Consult House of Orléans, M. Coryn, 1936.

Orléans, CHARLES, DUKE OF (1391-1465). French poet. Son of that duke of Orléans who was



Charles,
Duke of Orléans

murdered by the Burgundians in 1407, he married his cousin, Isabella, widow of Richard II of England, in 1406. In joint command at

1415, he was taken prisoner and not ransomed till 1440, when he returned to France. He ranks as the greatest of the late French medieval poets. His works comprise about 100 ballads and songs, and about 400 rondeaux, marked by delicacy and charm and the nostalgia of an exile. Charles died at Amboise, Jan. 4, 1465.

Orléans, GASTON, DUKE OF (1608-60). French prince. Son of Henry IV, Jean Baptiste Gaston was born April 25, 1608. He was made duke of Anjou and then duke of Orléans, and was no sooner of age than he began his career as a rebel against the existing political order; until 1638, when Louis XIII had a son, he was heir to the throne. Richelieu was his special antipathy, but plot after plot only resulted in the discomfiture and exile of the prince. Several times he succeeded in returning, and in 1643, when Louis died, had a position of responsibility, but the outbreak of the Fronde recalled him to more congenial occupation. After changing from side to side, he was exiled from Paris, and died at Blois, Feb. 2, 1660.

Orléans, HENRI PHILIPPE MARIE, PRINCE OF (1867-1901). French traveller. Eldest son of Robert, duke of Chartres, and thus a member of the royal family of France, he was born in Surrey, Oct. 16, 1867. He made his mark as a traveller and did much exploring in Asia and Africa. He found the sources of the Irawadi, and discoveries in Tibet gained him the medal of the Paris geographical society. Some public remarks about the conduct of Italian soldiers in Abyssinia led to a duel between him and the count of Turin, a member of the Italian royal family. The prince died in Assam, Aug. 9, 1901.

Orléans, HENRIETTA ANNE, DUCHESS OF (1644-70). English princess, third daughter of Charles I and Henrietta Maria. She entered in this work as Henrietta.

Orléans, LOUIS PHILIPPE JOSEPH, DUKE OF (1747-93). French nobleman, better known as Philippe Egalité. Born at St. Cloud, April 13, 1747, he was son of Louis Philippe d'Orléans and cousin of Louis XVI. He served in the navy, succeeded to the title in 1758, and became known for his

dissipated life and democratic ideas. Bitterly disliked by Louis and Marie Antoinette, he supported the claims of the third estate, 1789, entered the national convention, 1792, and voted for the execution of Louis. Arrested in April, 1793, he was acquitted of conspiracy at Marseilles, but was tried again at Paris, and guillotined Nov. 6.

Orléans, LOUIS PHILIPPE ROBERT, DUKE OF (1869-1926). Claimant to the crown of France. Born at Twickenham, Middlesex, Feb. 6, 1869, son of the count of Paris (1838-94), he was educated at the Collège Stanislas, Paris. Exiled by the law of 1886, he entered Sandhurst, 1887, and served with the 60th Rifles in India. In 1890, having gone to Paris to claim the right of performing a Frenchman's military duties, he was sentenced to two years' imprisonment, but was soon released. In 1896 he married the archduchess Maria Dorothea of Austria. An experienced traveller, he published *Une Croisière au Spitzberg*, 1905, and *Chasses et Chasseurs Arctiques*, 1911. On March 28, 1926, he died at Palermo. See Orléans, House of.

Orléans, PHILIP I, DUKE OF (1640-1701). French soldier. Son of Louis XIII and Anne of Austria, he was born at St. Germain, Sept. 21, 1640, and bore the title of duke of Anjou until 1661. He married in 1661 Henrietta, daughter of Charles I of England, and in 1671 Charlotte Elizabeth of Bavaria. He fought in Flanders, 1667, in Holland, 1672, and was in command at the victory over the prince of Orange near Cassel, 1677. He incurred the jealousy of Louis XIV by his military successes, but was present at the sieges of Mons, 1691, and Namur, 1692. He died at St. Cloud, June 9, 1701.

Orléans, PHILIP II, DUKE OF (1674-1723). Regent of France. Son of Philip, duke of Orléans, and so a near kinsman of Louis XIV, he was born Aug. 4, 1674. As a soldier he served in Flanders, Italy, and Spain. He was prominent among those who, after a succession of deaths in the royal family, tried to seize the reins of government in view of the king's approaching end. Louis XIV named him in his will as president of the council of regency for the young Louis XV, but Orléans wanted more than this titular office, and, assured of popular support, boldly seized the supreme power and ruled France from 1715 until his death, Dec. 23, 1723, although Louis XV came of age Feb. 15, 1723.



Philippe Egalité,
Duke of Orléans
After Reynolds

Orléans introduced domestic reforms, struck hard at the influence of the Jesuits, and in other ways showed a desire to do well for France. But he was not the man to cope with the state of affairs; the finances were in chaos, and the schemes of John Law (*q.v.*) made matters worse. In foreign affairs the regent was hostile to Spain. Orléans was a dissolute man in a dissolute age, and his name is almost a byword for excesses of every kind. Yet he had marked abilities, loved music, studied chemistry and philosophy, and both as an orator and a soldier was more than mediocre.



Philip II,
Duke of Orléans
After J. B. Santerra

Orlikon Gun. Automatic gun of Swedish invention adopted by the Royal Navy and merchant navy as an anti-aircraft weapon. Mounted on a turntable, it fired 500 rounds of 20-mm. ammunition per min. to an effective range of 5,000 ft.

Orloff. Name of a Russian family. Its first prominent member was Grigorei (1734-83). Having

distinguished himself in the Seven Years War, he attracted the favourable notice of the grand duchess Catherine, and was the leading spirit in the conspiracy to



G. I. Orloff,
1734-83

place this princess on the throne in 1762. He afterwards lost favour at the court, chiefly owing to the rise of Potemkin, and died mad.

His brother, Alexis (1737-1809), began life as a simple soldier. He was a man of great courage and audacity, and was one of the assassins of Peter III in 1762. He was created an admiral in 1768 and defeated the Turks at Chesme. In 1796 he was exiled by Paul I. His nephew, Grigorei Vladimirovitch (1777-1826), was a scholar, who chiefly devoted himself to history, politics, and literature. With him died the legitimate male branch of the family. Alexis Fedorovitch (1787-1861) distinguished himself in the Napoleonic wars. After concluding the treaty of Adrianople, Sept. 14, 1829, he went as a plenipotentiary to Constantinople, and in 1833 persuaded the sultan to

sign the peace of Unkiar-Skelessi. His son, Nikolai Alexievitch (1827-85), after distinguishing himself at the siege of Silistria in 1854, became ambassador at Brussels, Paris, and Vienna. See Gatschina.

Ormesby. Parish in Stokesley rural district, since 1913 part of Middlesbrough. The chief building is the Norman church of S. Cuthbert while the Hall is a capacious mansion. The iron, steel, and chemical works of Tees-side have extended here and brought a pop. est. at 3,000. Ormesby has a rly. station. This is also the name of one of the Norfolk Broads.

Orme's Head, GREAT AND LITTLE. Promontories, 4 m. apart, on the coast of N. Wales, in the



Orme's Head, North Wales. View of the Great Orme from the pier at Llandudno

N.E. of Carnarvonshire. Llandudno is on the bay between them. The Little Orme is a limestone height rising sheer from the sea, and its caves can be reached only by boat. The Great Orme is flat topped, a road specially constructed in 1879 encircles it, and a funicular rly. gives access to the summit. A lighthouse with group occulting light is 325 ft. above high water.

Ormolu (Fr. *or*, gold; *moulu*, ground). One of the brass alloys. It generally consists of copper 58 parts, zinc 26, and tin 16, and is employed in the preparation of small statues, candlesticks, and other articles, and as the basis of a form of enamel work. In the latter, a design is chiselled in the metal and the cavities are filled with enamel material, which is fused into a solid mass with the metal by heating. Such enamel is styled *émail cloisonné*. The art has long been practised by the Chinese. See Louis Style.

Ormonde. English racehorse. Bred at Eaton, Chester, in 1833. by the duke of Westminster, he was unbeaten and won 15 races, including the 2,000 Guineas, Derby, and St. Leger. During the Jubilee

festivities in 1887 Ormonde was brought to Grosvenor House and fêted. After his racing career he went to Argentina, and eventually to California, where he died in 1904. His skeleton was set up in the Natural History Museum, S. Kensington, and his stock proved vigorous and successful.

Ormonde, EARL AND MARQUESS OF. Irish titles, held by the family of Butler. The 1st earl was James Butler (c. 1305-37), who married a granddaughter of Edward I. James, 2nd earl (1331-82), and James, 4th earl (d. 1452), each held the post of governor of Ireland. The 5th earl, James (1420-61), came to England, was created earl of Wiltshire in 1449, was high treasurer in

1455 and 1459, but fell with the Lancastrian party. His two brothers, the 6th and 7th earls, were ambassadors in the service of the English crown. On the death of the latter in 1515 the title fell into abeyance. In 1538 the title was resumed by Piers Butler, cousin of the last earl. Thomas (1532-1614),

grandson of Piers, was the 10th earl, and a Protestant, aiding Elizabeth in repressing the rebellion in Munster. His kinsman, James (*v.i.*), the 12th earl, was made marquess in 1642, and duke in 1661. (See Kilkenny.)

The dukedom was lost when the 2nd duke was attainted in 1715, but on his death in 1745 his brother called himself earl of Ormonde. In 1791, after a period during which there was no earl, a relative, John Butler, was declared earl. For his son the marquessate was revived in 1816. It became extinct in 1820, but was revived in 1825. In 1949 it came to James (b. April 25, 1893), 6th marquess, who is also earl of Ossory, Viscount Thurles, Baron Ormonde in the U.K. peerage, and the hereditary chief butler of Ireland.

Ormonde, JAMES BUTLER, 1ST DUKE OF (1610-88). Irish royalist. Born Oct. 19, 1610, he was brought up under James I's wardship, succeeded to the earldom in



1st Duke of
Ormonde
After Kneller

1632, and became a valuable supporter of Wentworth in Ireland, 1634-40. From 1641 he kept the disaffected Irish in check by his able generalship, and was made lord-lieutenant, 1644. During 1644-46 Ormonde had to face the double opposition of the Catholic rebels and of the parliamentarians; the terms of a peace with the latter forced his withdrawal from Ireland, 1647. He returned, 1648, but after defeat retired to France, 1650. Faithful to Charles II in exile, he became duke of Ormonde in 1661, and was lord-lieutenant 1662-69 and again 1677-84. He died July 21, 1688. *Consult* Life, W. A. H. C. Gardner, 1912.

Ormonde, JAMES BUTLER, 2ND DUKE OF (1665-1745). Irish soldier. Grandson of the 1st duke, he



2nd Duke of Ormonde
After Kneller

was born in Dublin, April 29, 1665, and succeeded to the dukedom in 1688. He supported the accession of William of Orange, under whom he fought at the Boyne, 1690, Steenkerk, 1692, and Landen, 1693. Lord-lieutenant of Ireland, 1703-07 and 1710-13, he also commanded the English armies in Flanders, 1712. There he obeyed secret orders to remain inactive, was relieved of his generalship, 1714, and impeached as a supporter of James Stuart, 1715, his estates being confiscated by the crown. Thereafter he lived abroad, commanded the Spanish fleet organized against England, 1719, and died Nov. 16, 1745.

Ormskirk. Urban dist. and market town of Lancashire, England. It is 12 m. by rly. N.N.E. of Liverpool. The church of SS. Peter and Paul, mainly Perpendicular, has a tower and spire side by side; it contains the burial vault of the Stanley family, whose former seat, Lathom House, is near. The town has a 17th century grammar school. The chief industries are brewing and brassfounding. Ormskirk is noted for its gingerbread. Market day, Thurs. Pop. 21,300.

Ormulum. Book of metrical paraphrases of the Gospels, with commentary. It was written by Orm or Ormin, an Augustinian monk of N.E. Mercia, late in the 12th or early in the 13th century, and was first printed by R. M. White in 1852; new ed. R. Holt,

1878. A copy in MS. is in the Bodleian at Oxford.

Ormuz, STRAIT OF. Winding passage between the Gulf of Oman and the Persian Gulf. See Hormuz.

Ormuzd, ORMAZD, OR AHURA MAZDA. In Zoroastrian mythology, a being, or principle, representing



Ormuzd fighting the spirit of darkness in the form of a winged lion. From a relief found at Persepolis

light and goodness. He was the elder of the two emanations from the Eternal One; the second being Ahriman, the spirit of Evil. They are regarded as ever working against each other, every good thing created by Ormuzd at once receiving its equivalent ill from the other, but in the end the victory of Ormuzd is assured.

Ornain. River of France, a tributary of the Marne. It rises near Neuville, in the dept. of Haute-Marne, and flows past Ligny and Bar-le-Duc. Its chief affluent is the Saulx, and its length is 75 m.

Ornament. Embellishment added to the appearance of a person or object for the sole purpose of gratifying the eye. In design, the inclusion or addition of ornament is irrespective of the primary purpose of the object designed; or, alternatively, the purpose of the object may be purely ornamental—hence the once-common division of things into “useful” and “ornamental,” with many gradations between in which the two qualities are combined. Certain forms of ornament are classical (e.g. egg and dart ornament in architectural mouldings, Greek fret patterns), others traditional, others again the expression of the craftsman’s exuberance or his pride in his work. Traditional ornament makes wide use of formal pattern, following well-established laws concerning rhythm, repetition, contrast, etc.

Ornament is most acceptable when judiciously used to relieve bare surfaces (as with wallpaper), to provide contrasts, or to enrich the general effect; but no amount of it will serve to make beautiful an object that is intrinsically ugly, nor should it be something extra “applied” to the object, but rather an integral part of the designer’s original conception.

The overloading of objects (e.g. architecture, furniture, dress) with ornament in the 18th and 19th centuries, combined with the debasement introduced by machine-made ornament, led to a 20th century revulsion against its use. Designers sought to please the eye by the inherent beauty of shape or sheer fitness for purpose of an object; and public taste, shocked at first by the starkness of architecture, furniture, etc., denuded of the traditional frills, gradually accustomed itself to the new standards. It would not be true to say that the 20th century has discarded ornament; but it has at least begun to keep it to its proper place after generations of misuse. See Aesthetics; Functionalism.

Ornament. In anthropology, the embellishment of the human body. Originating in a remote past, in some instances for amuletic protection, it is in universal use, especially for self-display, tribal discrimination, or ceremonial distinction. It is applied to the person by adhesion, entanglement, insertion, or encirclement. Adhesive ornament includes the application of paints and unguents to skin and hair, a practice traceable to Palaeolithic Europe. Neolithic Crete used pottery stamps for printing coloured designs upon the skin. Body-painting, still widespread, is effected by mineral pigments and such vegetable extracts as the Ancient British woad. Andamanese smear themselves with earth and lard, and draw lines therein with the fingers. Fijians bleach the hair with lime; Kavi-rondo negroes wear white clay stockings; Tibetan women form designs with seeds embedded in starch paste upon the cheeks.

Ornaments that encircle the body or its parts are of most importance, because they gave rise to clothing in all its forms. Headbands developed, not only into garlands and diadems, but also into protective headgear. Necklaces, originally thongs and grasses, sometimes plaited, bore perforated berries, shells, and teeth, at first often amuletic. The purpose was afterwards associated with pen-

dants, such as the rats' ears enclosed in Etruscan gold lockets or the bright beetles reproduced as durable scarabs in ancient Egypt. Necklets of human teeth and bones occur in Melanesia. Girdles and belts, which preceded waist-cloths and skirts, acquire decorative forms in African cowry-strings and bead-strings, the tinkling attachments of Bronze-age Europe and Patagonia, and the buckles of civilized dress. *See* Celt, colour plate, Dress; Earring; Jewelry; Lip-Ornament; Mutilation; Nose-Ornament; Ring.

Ornaments. In music, notes which could be dispensed with, without rendering the melody or the harmony incomplete or unintelligible. This definition includes passing notes, appoggiaturas, acciacaturas, mordents, syncopations, shakes, trills, and turns. often also scales and arpeggios.

Ornaments. Term for all articles used in, and subservient to, divine worship. Ornaments of the church include the altar or communion table, paten, chalice, vessels for wine and water, font, pulpit, Bible, Book of Common Prayer, etc.; of ministers, alb, chasuble, cope, surplice, rochet, pastoral staff, mitre, etc. In the Anglican Church, images, crosses, flowers, banners, etc., are allowable as decorations. The question as to what is permitted according to the Ornaments Rubric in the English Book of Common Prayer has involved much controversy and litigation, but generally most of the ornaments used in 1549 are regarded as legal. Much of the controversy centres in the distinction between decorative and symbolical use. *See* Ecclesiastical Law; Ritual Ritualism; Vestments.

Orne. River of France. It rises near Sées and flows through Normandy into the English Channel. It is navigable for vessels of from 10 to 12 ft. at spring tides. Towns on its banks are Argentan, Écouché, and Caen. There is a canal from Caen to the sea. The length of the Orne is 94 m.

Orne. Dept. of France. It is an inland region of Normandy, having an area of 2,371 sq. m. and a pop. of 273,159. It has a number of hills, chiefly in the centre, but few in excess of 1,000 ft. high. The rivers include the Orne, which crosses the dept., Eure, Dives Touques, Sarthe, and Mayenne. The dept. is noted for its horses. Dairy farming is carried on, cattle are reared, fruit is cultivated, and cereals, including wheat and barley, are grown. Some of the land is

covered with forest. Alençon is the capital; other places are Argentan, Domfront, Montagne, Sées, and Flers. Before the Revolution, Orne was partly in Normandy and partly in Alençon and Perche. There was much fighting here in the summer of 1944. *See* Europe, Liberation of.

Ornitholestes (Gr. *ornis*, bird. *lestes*, robber). Extinct dinosaur. The animal was one of the smallest and most active of the dinosaurs and lived principally upon birds. *See* Dinosaur.

Ornithology (Gr. *ornis*, bird. *logos*, word). Science and study of birds. *See* Bird; Migration; and under the names of birds.

Ornithorhynchus (Gr. *ornithos*, of a bird; *rhynchos*, beak). Generic name for the platypus or duck-bill, one of three animals forming the zoological order Monotremata or Prototheria. These animals are the most primitive living mammals, and in several anatomical details show a marked resemblance to the reptiles. They are oviparous and have a common urino-genital anal opening, the cloaca. There are no mammary teats in the female, but the milk exudes locally through pores in the skin of the abdomen. Comparatively little is known of the habits of these animals, which are found in parts of Australia and Tasmania, but they live in pairs in burrows constructed in the banks of streams. Each burrow has two openings, one above and one below the surface of the water, and in the breeding season two eggs are laid in the nesting chamber. It is uncertain whether the mother hatches them. The animals are about at night, when they feed upon aquatic worms and insects. They swim and dive, but move awkwardly upon land. *See* Duckbill.

Orobanchaceae. A family of leafless herbs, root parasites. They are natives of temperate and tropical countries, particularly of Europe and Asia. The tuberous, fleshy, or scaly rootstock is attached by rootlets to the rootlets of its host, and the stout, scaly stem ends in a spike or spray of flowers. There are generally four or five sepals and a gaping tubular corolla. There are about 12 genera and 150 species. *See* Broomrape; Toothwort.

Orogeny (Gr. *oros*, mountain). Type of earth movement which results in the upheaval of mountain chains. It is confined to long, relatively narrow belts in the earth's crust—orogenic belts—such as the Alpine-Himalayan chains, or the mt. ranges of N and S. America

The interruption or termination of a prolonged period of quiet sedimentation by a mountain building episode is termed an orogenic revolution. *See* Earth Movement.

Orographic Rain. Rain produced by the dynamic cooling of moist air which is caused to rise on meeting high ground in its path. With the falling atmospheric pressure accompanying the ascent, the air expands and falls again as precipitation. Because of orographic rain, as distinct from rain of the cyclonic type, the hilly districts of the British Isles in the N. and W. are in general much wetter than the Midlands and S.E.

Orography (Gr. *oros*, mountain; *graphein*, to write). Science devoted to the geological and physical study of mountains and the mountain systems of the world. *See* Mountain.

Orontes, AXIOS, OR NAHR EL ASI (the rebellious river). River of Syria. It rises near Baalbek and the source of the Leontes, and flows N. between the Lebanon and Anti-Lebanon ranges. Emerging to the plains, it expands into the small lake of Homs or Kades, and then continues N. between rocky walls until it turns abruptly W. and S.W. and flows across the plains of Antioch to the shore of the E. Mediterranean. S. of Hama the valley is followed by the rly. from Aleppo to Beirut and Damascus. Length, 240 m.

Oropesa Float. Device for sweeping sea mines of the contact type. It consists of a hollow float in the shape of an elongated pear which is attached to the sweeping vessel by a wire and streams out at an angle. The wire, serrated to shear through the mine's mooring cable, is kept down to the required depth by a multi-plane kite. *See* Mine.

Oropus. In ancient Greece, a strong seaport on the Euripus, on the borders of Attica and Boeotia. After belonging alternately to Athens and the Boeotian league, with intervals of independence, after 146 B.C. it became a Roman provincial town, being again restored to the Athenians by Antony or Augustus. The town was celebrated for the sanctuary of Ampharaus (*g.v.*), a god of healing.

Orotava. Town of Tenerife, Canary Islands. It is near the N. coast, in a beautiful valley, and is a health resort. Bananas, potatoes, wine, and cochineal are exported.

Oroya. Town of Peru, in Junin dept. It lies 137 m. E.N.E. of Callao and is on the highroad

over the Andes from that seaport to Pucallpa. Here is the copper smelting works of the Cerro de Pasco corporation, which employs many foreigners. Pop. 15,000.

Orpen, SIR WILLIAM (1878-1931). British painter. Born in Dublin, Nov. 27, 1878, he studied



Sir William Orpen,
British painter
Elliott & Fry

at the Slade school, and began to exhibit at the New English art club in 1899. Elected A.R.A. in 1916, and R.A. in 1919, he was at first chiefly attracted by interior subjects, but developed into one of the outstanding portraitists of his day. A fine draughtsman, crisp and direct in his brushwork, and evincing a lively satirical humour in his treatment of a subject, he was led by love of bright colour into occasional over-brilliance. His portraits in the Tate Gallery include those of Dame Madge Kendal, Sir William McCormick, and his own wife. An official war artist on the Western front, 1917, he went on to paint scenes at the Paris peace conference. His many war pictures may be studied at the Imperial War Museum. They evince a strong sympathy for the fighting soldier. Orpen recounted his experiences in *An Onlooker in France, 1917-19*, published 1921. Knighted 1918, he died Sept. 29, 1931. A memoir by P. G. Konody and S. Dark appeared in 1932.

Orphan (Gr., destitute). Child or minor deprived by death of father, or father and mother. In the U.K. the lord chancellor is the general guardian of all orphans. The *Widows', Orphans', and Old Age Contributory Pensions Act* of 1925 introduced pensions of 7s. 6d. a week, under the national health insurance scheme, for children under 14 who had lost both parents. A widow's pension was converted to an orphan's pension on her death if the child was still under the specified age. The allowance, paid to the guardian, was increased to 12s. weekly by the *National Insurance Act* of 1946. See *Children, Law about*.

Orpheus. In Greek mythology, son of the muse Calliope. He was famed for his extraordinary skill with the lyre, bestowed upon him by Apollo. So compelling was his music that not only the beasts of the field but even trees and rocks followed the sounds of his lyre.

He accompanied the Argonauts in their expedition to the Black Sea, and lulled to sleep the dragon which guarded the Golden Fleece. On the return of the expedition, he settled in Thrace, and there his wife Eurydice (q.v.) died of a serpent bite. Her memory remained with Orpheus and he consistently repelled the advances of the Thracian women, who in revenge for his contemptuous treatment tore him to pieces. The muses set his lyre among the stars. Tradition represents Orpheus as a poet as well as a musician.



Sir William Orpen. *Le Chef de l'Hôtel Chatham*, the painting exhibited at the Royal Academy Exhibition of 1921 and later presented by the artist to the R.A. as his diploma picture

Orphism. Term for the mystical doctrines associated with the brotherhood reputed to have been founded by the Thracian Orpheus, and first mentioned by Ibycus 530 B.C. The Orphic rites in which they were engaged were closely connected with the worship of Dionysus. The sect, which continued into Roman times, believed in original sin and transmigration of souls, abstained from certain foods and bloody sacrifices, practised purification rites, and were at a later period associated with the sect of Pythagoreans.

Orpiment (Lat. *auri pigmentum*, gold pigment). Native form of arsenic. Chemically it is arsenic trisulphide (As_2S_3), or yellow sulphide of arsenic. It occurs as lemon-yellow masses in the oxidised portions of arsenic veins and is often associated with antimony minerals. It is worked in Transylvania, Kurdistan, and elsewhere; it also occurs as a deposit from some hot springs, and as a sublimate from volcanoes at Naples. Realgar, or arsenic disulphide, is called red orpiment and is used in fireworks.

Orpington.

Urban dist. of Kent, England. It is 14 m. S.E. of London and virtually a suburb, being the terminus of an electric rly. The river Cray rises here, and in the district are large areas under fruit and vegetables. All Saints' church mainly E.E. has some old brasses. At Orpington in 1873 Ruskin set up a printing establishment. The last German rocket fell here on March 27, 1945. Orpington gives its name to a co. constituency. Pop. 58,000

Orpington.

Name given to certain domestic fowls. The claim made for them

that they constitute a distinct breed is disputed. Their name arose from the fact that the Black Orpington was raised by W. Cook of that place, who stated that he raised it from crossings of the Black Plymouth Rock, the Langshan, and the Minorca. The Buff Orpingtons are said to have been bred from Cochins crossed with ordinary farmyard fowls, and selected until the type was fixed. Orpingtons are excellent general purpose fowls, both good layers and good table birds. There is also a white Orpington. See *Fowls colour plate*.



Orpington. Cock of the white variety of the breed

Orr, Sir John Boyd (b. 1880). British expert on nutrition, who in 1949 was created Baron Boyd-Orr.

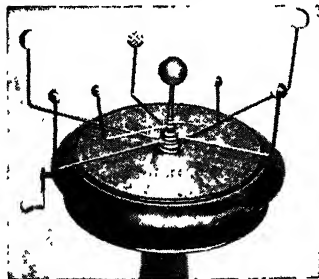


Lord Boyd-Orr,
British expert,
on nutrition

Born Sept. 23, 1880, in Ayrshire, he took a medical degree at Glasgow university. During the First Great War he served in the R.A.M.C., winning the D.S.O. He sat on committees on fat stock, milk, and cattle for the ministry of Agriculture, and on nutrition for the ministry of Health. Director of the imperial bureau of animal nutrition, he was knighted in 1935. He was professor of agriculture at Aberdeen, 1942-45, and chancellor of Glasgow university, 1946. Independent M.P. for Scottish universities, 1945, he retired on taking up appointment as director-general of the United Nations food and agriculture organization, 1946; he resigned that post in 1948. He was awarded the Nobel peace prize, 1949. The author of the article Food and Nutrition in this Encyclopedia, he published *Food, Health, and Income*, 1936; *Food and the People*, 1944.

Orrell. Urban dist. of Lancs, England, adjoining Wigan on the W. There are two rly. stations, while the Leeds and Liverpool canal passes along the N. boundary. A cotton mill provides employment, but the dist. is mostly agricultural and residential. Pop. 8,600.

Orrery. In astronomy, a device or framework for exhibiting the motions of the planets about the



Orrery made by Benjamin Martin,
c. 1770
Science Museum, S. Kensington

sun. It is so called from the 4th earl of Orrery, for whose instruction one was first made in the 18th century. See *Planetarium*.

Orrery, Earl of. Irish title borne by the family of Boyle since 1660. Roger Boyle (1621-79),

1st earl, was a younger son of the 1st earl of Cork. Born April 25, 1621, he was educated at Trinity College, Dublin. As Baron Brighthill, he fought for Charles I in 1642, but for the parliamentarians in 1647, and as a general in Ireland under Cromwell in 1650. Though he had been in the Protector's council, he secured Ireland for Charles II and was created earl of Orrery in 1660, and lord president of Munster, 1660-68. He died Oct. 16, 1679. His romance, *Parthenissa*, appeared in 1654; his *Treatise on the Art of War* in 1677; and he wrote poems and tragedies.

John, the 5th earl, succeeded to the earldom of Cork in 1753, and since then the two titles have been united. See *Cork, Earl of*.

Orris Root. Dried rhizome of the Florentine iris (*I. florentina*), which gives off a strong violet-like odour causing it to be extensively employed by perfumiers. "Essence of violets" is prepared from it, and it forms the basis of "violet powder" and other toilet powders. It is chewed to disguise offensive breath, and it possesses emetic and cathartic properties. Some of the orris-root of commerce is obtained from *Iris pallida*. Both species are natives of the Mediterranean region. See *Iris*.

Orsay, Alfred Guillaume Gabriel, Count d' (1801-52). French dandy. Born in Paris,

Sept. 4, 1801, he served as lieutenant of Louis XVIII's bodyguard, and in 1822 formed an intimate friendship with the 1st earl and countess of Blessington, with whom he travelled in Italy. In 1827 he married Lady Harriet Gardiner, daughter of the earl's first marriage. After Blessington's death in 1829, d'Orsay lived with the countess at Kensington, and their house became famous as an intellectual and social centre. D'Orsay was of fine appearance, and a brilliant conversationalist. With Lady Blessington he left for Paris, bankrupt, in 1849, and was appointed director of fine arts shortly before he died on Aug. 4, 1852. See *Beaconsfield, Earl of*; *Houghton, 1st Baron*.

Orsborn, Albert William Thomas (b. 1886). General of the Salvation Army. Born Sept. 4,

1886, he came from Toronto, where both his parents were pioneer members of the Salvation Army. He became an officer himself at 19, held administrative posts in New Zealand and in the Salvation Army international training college, and was territorial commander for Scotland and Ireland. Salvationists knew him for "war-songs" and poetry in their periodicals. Awarded the C.B.E. in 1943, he was British commissioner of the S.A. from 1940 and succeeded G. L. Carpenter as general in 1946.

Orsha. Town of White Russia S.S.R. It stands at the junction of the Dnieper and Orshitsa, 50 m. by rly. N. of Mogilev, and is an important rly. centre.

It trades in grain and timber and has ironworks. The Germans seized it in July, 1941, and built it up as a strong defence point. The 3rd White Russian army recaptured it in a dual attack from the E. and the N.W., June 27, 1944.

Orsini, Felice, Count (1819-58). Italian revolutionary, born at Meldola, Romagna. He became an advanced liberal, and in 1844 was sentenced to life imprisonment for his connexion with the revolutionary party. Liberated under the amnesty of Pius IX, 1846, he was a member of the government of Rome during the republic of 1849, and on its fall became an indefatigable agitator. Regarding Napoleon III as the incarnation of the spirit of reaction, Orsini made his way to Paris, and on Jan. 14, 1858, threw a bomb at the emperor and empress as they drove to the Opéra. They escaped injury, but ten people were killed and 150 wounded by the explosion, Orsini among them. He was arrested and on March 13 executed.

Orsk. Town of the R.S.F.S.R. In Chkalov region, it is 155 m. S.E. of that town (formerly Orenburg). Near the junction of the rivers Or and Ural, it is on the border of Asia, in the Ural industrial zone. Concerned with oil refining, it is the terminus of a pipe-line to Guriev on the Caspian. There are nickel and chrome deposits, and brick, tallow, and soap works. Orsk was originally a fortress of the so-called Orenburg line, set up against Kirghiz inroads. Pop. 65,799.



Felice Orsini,
Italian revolutionary
After Vintner



Count d'Orsay,
French dandy

After R. J. Lane, R.A.

Orsova. Two towns of Rumania, known as Old and New, and formerly in the S.W. corner of Hungary. Pop. 8,528. Here the Carpathians terminate against the Danube, and 5 m. downstream are the Iron Gates; parallel with them the Cserna flows S. to the Danube, and Orsova marks the confluence of the two streams. The rly. from Budapest follows the Cserna and Danube valleys past Orsova station $2\frac{1}{2}$ m. from the town. Close to the station Kossuth buried the Hungarian crown in 1849. Old Orsova stands on the W. bank of the Cserna. New Orsova, on the E. bank, was a Turkish fortress. See Rumania. *Pron.* Orshöva.

Ortegal. Cape on the N.W. coast of Spain, one of the most northerly points of the Spanish seaboard. It is known for the naval engagement, also called the battle of Cape Ferrol, that took place off here between the British and the French, Nov. 4, 1805. The action consisted of a successful attack by Strachan, in command of three line-of-battle ships and four frigates, upon four French ships of the line. These vessels had escaped from Trafalgar, and with their capture the French fleet was destroyed. See Trafalgar.

Ortega y Gasset, JOSÉ (b. 1883). Spanish philosopher. A humanist writer, he became professor of philosophy and literature at Madrid university. Before the Spanish Civil War he was a deputy and leader of a parliamentary group. He left Spain after Gen. Franco's victory and lived in Buenos Aires. His chief works are *El Tema de Nuestro Tiempo*; *La Rebelión de las Masas*; *Aurora de Nuestro Tiempo*.

Orthez. Town of France. It stands on the Gave de Pau in the dept. of Basses-Pyrénées, 25 m. N.W. of Pau. There is a 13th century tower, part of the destroyed castle, an old church with a remarkable choir, and a modern town hall. The industries include the manufacture of cotton, paper, and leather, milling, and an agricultural trade. Orthez was in the 13th century the capital of the viscounts of Béarn. With Béarn it became part of the lands of the counts of Foix, and here Gaston Phoebus held his splendid court, vividly described by Froissart. There was a university here in the 16th century; the building is now a factory. It was a centre of Calvinistic teaching, and Protestants are still numerous in the town. The river is here crossed

by two bridges, one 14th cent. Pop. 6,000. *Pron.* Ortay.

Orthez, BATTLE OF. One of the concluding actions of the Peninsular War, Feb. 27, 1814. After manoeuvring for some days round Orthez, the British under Wellington had forced the Gave de Pau river, when Soult took up a position near the Dax-Pau main road. Wellington immediately made dispositions to cut off his retreat. An attack on the French right early in the morning failed, but a boldly conceived and brilliantly executed assault on the left, effected by wading through marshes reputed to be impenetrable, was completely successful, and the French were driven back in confusion. Hill had cut off their main retreat along the Pau road, but by skilful strategy Soult effected his escape.

Orthite OR ALLANITE. In mineralogy, a member of the epidote group of minerals consisting of a complex hydrated silicate of calcium, aluminium, iron, and the cerium metals. It occurs as brown to black crystals or grains in certain granites, syenites, or diorites and their metamorphic equivalents; occasionally as large segregations in pegmatitic deposits.

Orthoceras (Gr. *orthos*, straight; *keras*, horn). Genus of fossil nautiloid cephalopods. They are distinguished



Orthoceras. Specimen of *O. undulatum*

by their straight horn- or cone-shaped shells, the exterior of which is smooth or striated, and the interior divided into chambers by partitions. The fossil is important, as it serves as one of the index fossils, and was very common in Palaeozoic limestones. It is found in deposits from Silurian to Triassic times. The surviving nautilus is descended from the fossil orthoceras.

Orthochromatic Photography. Process by which the relative values of coloured objects as seen by the eye are recorded in monochrome more correctly than by the use of ordinary plates. Ordinary photographic emulsions are sensitive only to blue and violet light; hence greens, yellows, and reds are not

adequately represented, being recorded almost as black. An improvement is effected by combining dyes with the emulsion so that it becomes proportionately more sensitive to green and yellow, such an emulsion being known as orthochromatic (or isochromatic). Its sensitivity can be balanced still further by filters to accord more nearly with that of the human eye, which is extremely sensitive to light of yellow-green colour. Orthochromatic materials are much used for snapshots, landscapes, and some portraiture. Emulsions sensitive to all colours of the visible spectrum are called panchromatic. See Colour Filter. Emulsion; Photography.

Orthoclase (Gr. *orthos*, straight; *klasis*, fracture). In geology, a potassium aluminium silicate or potash feldspar. It is a constituent of many crystalline rocks, e.g. granite porphyry, gneiss, etc.; has a lustrous glassy white, light yellow, green or red colour; and crystallises in the monoclinic system. It is widely distributed, but workable deposits are found only in granitic pegmatites, mainly in the U.K., U.S.A., and Manchuria. Many varieties are cut and polished for gemstones, e.g. moonstones and sunstones; and it is useful in the ceramic trades.

Orthodox Eastern Church. Alternative name for the Holy Orthodox Catholic Oriental Church, also known as the Greek Church (*q.v.*).

Orthodoxy (Gr. *orthos*, right; *doxa*, opinion). Term commonly used for soundness of religious belief, but applicable in other spheres of thought. Its use assumes the existence of some standard by which opinion can be tested; but this standard differs considerably in the various sections of the Christian community. The Christian Church as a whole is agreed upon the fundamental doctrines of the Gospel; and these form the real test of orthodoxy.

Shades of belief or thought that are not four-square with orthodoxy are called heterodox; while any teaching which directly contradicts the orthodox faith, or is plainly inconsistent with it, is called heresy. The Greek Church, which claims to have been pre-eminent in conserving the primitive faith, styles itself the Holy Orthodox Church. See Christianity.

Orthogenesis. This zoological term, proposed by Eimer in 1895, has been variously used by later workers. To some it has implied no more than evolution by

definite and successive variations in a given direction, as contrasted with indefinite variation; but many have used the term with some implication of causation, the direction of evolution being supposed to be dependent upon some internal factor, or at least to be independent of environment. Orthogenesis has received most sympathetic attention from palaeontologists, and, since their material is often too incomplete to afford a basis for final conclusions, the term can be used to indicate the nature of the phenomena observed, than as an explanation of the mechanism involved. An example is found in the oyster-like *Gryphaea* in whose later stages there are changes thought to be out of harmony with environment and which may lead to extinction. See Evolution.

Orthogonal Projection. A projection made by lines drawn at right angles to the plane on which the projection is made. A plan is an orthogonal projection on a horizontal plane; it is the shape that would be traced out by lines drawn from the boundaries of the object at right angles to the horizontal plane. In an orthogonal projection the length of a straight line when projected varies according to the angle at which it is inclined to the plane. The orthogonal projection of a square diminishes in width as the angle increases, until finally, when the square is at right angles to the plane of projection, the latter becomes a straight line. The orthogonal projection of a circle inclined to the plane of projection is an ellipse, the minor axis of which diminishes as the angle of inclination of the circle increases.

Orthography (Gr. *orthos*, correct; *graphein*, to write). Term generally used to signify correct spelling. It is also more precisely used to mean the exact representation of the sounds of a language by written signs. The ideal of "Write as you speak" has never been realized, for various reasons. The numerous shades of sound would require too many corresponding signs; pronunciation constantly changes, whereas spelling is more conservative; certain words are wrongly spelt in accordance with a supposed derivation (thus, *island* has nothing to do with *isle*); imported foreign words are sometimes altered, sometimes not (compare *fancy* and *phantom*). Italian and Spanish come nearest the ideal; English and French are most remote from it.

Orthohydrogen. Hydrogen of which the rotational quantum number of the atoms is odd. It is thus in contrast to parahydrogen, for which it is even. At ordinary and higher temperatures the ortho-type is three times as numerous as the para-type, but this tendency is reversed as lower and lower temperatures are reached.

Orthopaedics (Gr. *orthos*, straight; *pais*, child). Strictly, the treatment and correction of deformities in children, but the term has acquired a more general application. Orthopaedic hospitals and surgeons undertake the treatment of deformities and injuries of many kinds.

Orthoptera (Gr. *orthos*, straight; *pteron*, wing). An order of insects undergoing incomplete metamorphosis, the fore wings of which are linear, rather narrow, and leathery. They protect the large hind wings folded beneath them. More than 20,000 species are known and about 32 inhabit Great Britain. They include cockroaches, crickets, grasshoppers, locusts, mantises, and their allies which are referred to under separate headings. Many species, especially cockroaches, occur as fossils in the oldest rocks.

Orthoptics. (Gr. *orthos*, straight; *optikos*, of sight). System of exercises devised for the correction of certain pathological conditions of sight, or of malposition of the eyeball, resulting from imbalance of the eye muscles which regulate position and correlation.

Ortigueira. Watering-place of N.W. Spain, in Corunna prov., 23 m. N.E. of Ferrol. It stands on the E. shore of the Ria de Santa Marta, an almost landlocked inlet between capes Ortegal and de Vares. The harbour is shallow, and is used mostly for the fisheries and coasting trade. Pop. 21,600.

Ortler OR ORTLER SEITZE. Alpine peak in N. Italy, in the Trentino. The highest point in the E. Alps, 12,802 ft. alt., it rises S. of the valley of the upper Adige, S.E. of the Stelvio Pass, with Mte. Cevedale to the S.E. The ascent

was first made in 1804, the route from Sulden was discovered, 1865.

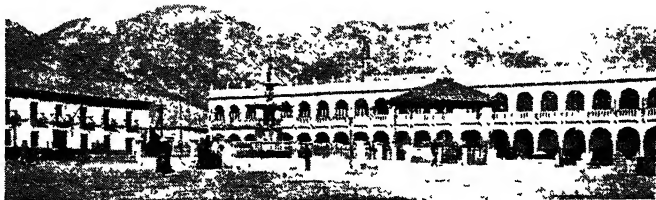
Ortolan (*Emberiza hortulana*). Bird of the bunting family. A summer migrant to Europe, spending the winter in Africa, its plumage is reddish brown, streaked with black on the upper parts, with a yellow throat and greenish breast and head. It nests on the ground, and feeds on insects and various seeds. It occurs very occasionally in S. England during the autumn months. The ortolan is greatly valued as a table delicacy, and large numbers are netted in S. Europe and fattened upon grain.

Ortona. Town of Italy, in Chieti prov. It is situated on the Adriatic Sea on a headland with a quay on the shore below, and is on the coast rly. 12 m. S.E. of Pescara. The cathedral and a ruined castle were noteworthy buildings. There is considerable trade in wine. Destroyed by the Turks in 1566, Ortona has suffered from earthquakes and has lost much of its earlier importance as a port. Ortona was entered by Canadian units of the British 8th army, Dec. 20, 1943; but the Germans were not driven out until Dec. 28, the town being left in ruins, which were full of mines and booby-traps. Civilian casualties of the fighting were heavy.

Oruro. Dept. and town of Bolivia. The dept. lies on the W. of the state between Chile and the main range of the Andes. It contains Lake Poopo and part of the Desaguadero which connects that lake with Lake Titicaca. The whole dept. is at an alt. exceeding 12,000 ft. and is arid and wind-swept. Tin is the chief mineral, the silver mines being nearly exhausted. Llamas and alpacas are kept, their wool being the chief product. The



Ortolan. Bird of the bunting family



Oruro, Bolivia. Government palace in the Plaza 10 de Febrero

town is a mining centre with an important school of mines; it is the chief rly. centre in the country, being connected with La Paz, Antofagasta, and Cochabamba. Its local industries include the manufacture of boots and alcohol. Area, 20,000 sq. m. Pop., dept., est. 199,800; town, est. 50,000.

Orvieto. A city of Italy, in Terni. It is built on a perpendicular, isolated rock near the Tiber, 60 m. N.N.W. of Rome. It trades in locally-produced wine. The superb cathedral, an excellent example of Italian Gothic, was begun in 1295, and is rich in sculptures, pictures, and mosaics. The museum, founded 1296, houses medieval works of art, and Etruscan and prehistoric antiquities. The Well of S. Patrick, adjacent to the citadel, has two spiral planes round the shaft which the water-carrying asses ascend and descend. The tombs in the Etruscan Necropolis date from the 5th century B.C. The town occupies the site of Volsinii, one of the twelve capitals of the Etruscan League, and was destroyed by the Romans in 280 B.C. It escaped serious damage in the Second Great War when the Allies passed through it without fighting June 14, 1944.

Orwell or GIPPING. River of Suffolk, England. Rising to the W. of Stowmarket, it flows S.E. to the North Sea. From its source to Ipswich it is known as the Gipping. The Orwell proper is an estuary, and extends for 11 m. from Ipswich to Harwich, where it merges with the Stour estuary.

Orwell, GEORGE. Nom-de-plume of the British writer Eric Arthur Blair (1903–1950). Born in India, he was a King's Scholar at Eton, served with the Indian imperial police in Burma during 1922–27, but returned to England and eventually settled down as a schoolmaster in the early 1930s. In 1936 he joined the Republican forces in the Spanish Civil War. He was for a time literary editor of Tribune, but was more noteworthy as an independent Socialist who turned his satirical wit impartially on the right and the left. *Burmese Days* (1934) described his early experiences; *The Road to Wigan Pier* (1937) dealt with unemployment; *Animal Farm* (1945) brilliantly satirised the dictatorial aspects of Soviet Communism; *Critical Essays* (1946) subjected various writers and publications to a keen and intelligent scrutiny; *Nineteen Eighty-Four* (1949) was a satirical prophetic novel. He died Jan. 20, 1950.

Oryx (Gr., pickaxe). Genus of large antelopes. It includes about four species, which occur in Africa, Arabia, and Syria. They have long



Osage Orange. Spray of foliage, with fruit, of this North American tree

and bushy tails and are distinguished by their long, ringed horns, which are nearly straight. See *Gemsbok*.

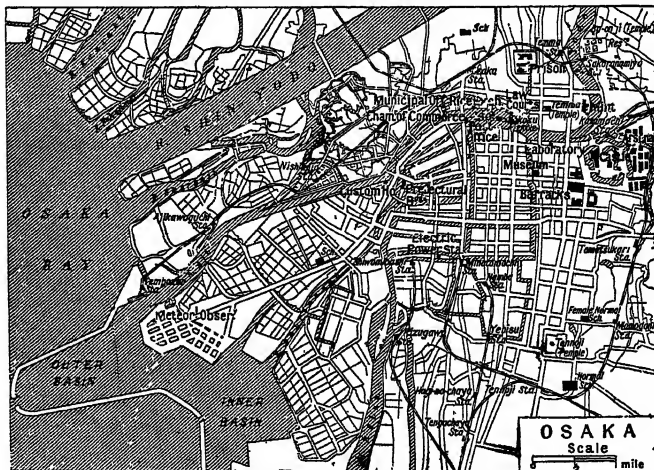
O.S. Abbreviation for old style, i.e. of reckoning dates. With the Julian year of 365½ days the date of the year did not actually correspond with the annual progress of the earth round the sun. In 1582, therefore, Pope Gregory XIII introduced a new calendar, the main feature of which was the addition of ten days to the existing date, i.e. Oct. 5 became Oct. 15. This was called the new style, and was soon adopted by the Roman Catholic countries, but less promptly by the Protestant ones. Great Britain did not make the change until 1752, when the difference between the two styles amounted to eleven days. It was ordered that Sept. 3 of that year should be reckoned as Sept. 14.

Discrepancies in dates of birth, deaths, etc., are sometimes due to a confusion between the two styles. See *Calendar*; *New Year's Day*.

Osage Orange (*Maclura aurantiaca*) OR Bow-wood. Small tree of the natural order Urticaceae, native of N. America. The stems are spiny, and the leaves oval to oblong-lance-shaped, and shiny. The flowers are inconspicuous and yellowish green. The individual fruits are small nutlets buried in the enlarged fleshy calyx; but a great number of them grow together, forming a multiple fruit, 3 ins. to 4 ins. in diameter, globular and yellowish green. The elastic bright orange wood was used by the Indians for making bows. It is much planted for hedges.

Osaka. City of Japan, in Honshu. It covers 8 sq. m. on the alluvial plain at the mouth of the Yodo and at the head of Osaka Bay. The temperature ranges from 27° F. to 100° F. A commercial and manufacturing city, its chief buildings of interest are the temples of Hokoku and Temma and the Japanese mint. Osaka Castle, 2½ m. distant, dates from 1584. The walls were built of granite stones, some 40 ft. long and 10 ft. high, but the superstructure was almost entirely destroyed by fire in 1868.

More than 7,000 factories (many of them small) produce 60 different classes of articles, of which the chief are cotton textiles, iron and metal goods, refined metals, leather goods, ships, glass-ware, confectionery, and patent medicines. There are many distilleries and breweries. Osaka is a great exporting centre for textiles, refined



Osaka. Plan showing the principal buildings and the harbour works of this Japanese seaport



Osaka, Japan. Ramparts of the castle built by Toyotomi Hideyoshi in 1584

sugar, and straw goods, especially in the trade with China and Korea. There are four exchanges for rice and cereals, stocks, cotton, cloth, and oils; the rice and cereal exchange regulates prices.

The city owes its prosperity to Toyotomi Hideyoshi, who built the castle and made his capital here. After the Toyotomi family lost power, Osaka retained its commercial importance, although Tokyo (Yedo) became the political capital. Kawamura Zuiken, in three years, 1684-87, constructed canals and embankments which secured the buildings against the floods of the Yodo. Its pop. in 1940 was 3,252,340, when it ranked 9th among the cities of the world. It was the object of heavy attacks from the air during the Second Great War.

Osborne, DOROTHY (1627-95). English letter writer. She was the daughter of Sir Peter Osborne, a royalist who held Guernsey for the king, and met Sir William Temple (*q.v.*) in 1648, becoming his wife in 1655. During their long courtship they maintained a correspondence, her share in which has been preserved and constitutes one of the outstanding contributions to English epistolary literature. She died at Moor Park, in Surrey, and was buried in Westminster Abbey in 1695. *See The Letters of Dorothy Osborne*, ed. E. A. Parry, 1888; rev. ed. 1903.

Osborne
After Sir Peter Leely

Osborne Case. Legal decision of the house of lords in 1909 which declared it to be illegal for British trade unions to make levies on their members for political purposes. Osborne had objected to a levy made on him by his union, the

Amalgamated Society of Railway Servants, for the purpose of making a payment to a Labour M.P. This decision led indirectly to the introduction of payment of members of the house of commons in 1911. The law was modified by the Trade Union Act, 1913, which permitted a political levy but exempted any member of the union who gave notice that he had objections to contributing. *See Political Levy.*

Osborne College. Former establishment for training cadets for the British navy. Opened Aug. 4, 1903, it was situated in the grounds of Osborne House, Isle of Wight. After passing the entrance examination, cadets under 13½ years of age went to Osborne for 2 years, passing thence to the Royal Naval College, Dartmouth. The college was closed in 1921, and the staff transferred to Dartmouth. *See Naval Cadet.*

Osborne House. Mansion in the Isle of Wight built for Queen Victoria. It is 1½ m. from E. Cowes,



Osborne House, Isle of Wight. Main front of the residence of Queen Victoria

and, commanding a fine view of the Solent, is surrounded by an estate of about 3,000 acres. In 1845 the queen bought about 2,000 acres from Lady Isabella Blachford and the house, in the Palladian style, was built by Cubitt. It was a favourite residence of the queen, who died here in 1901. There are other residences, Barton Manor and Osborne Cottage, on the estate. In 1902 Edward VII presented the house and estate to the nation. Part of it was devoted, at his wish, to a convalescent home for officers, but the royal apartments remained untouched, and are shown to visitors. The Medina flows through the estate, for which there is a rly. station at the neighbouring village of Whippingham.

Osbourne, LLOYD (1868-1947). American novelist. He was born at San Francisco, April 7 1868,

and educated at Edinburgh university. On the death of his father, his mother Fanny (née van der Grift) married R. L. Stevenson, and Osbourne, who lived with them in Samoa, where he was U.S. vice-consul, made a reputation by collaboration with his stepfather. Together they wrote *The Wrong Box*, 1889; *The Wrecker*, 1892; *The Ebb Tide*, 1894. Osbourne's own novels include *Love the Fiddler*, 1903; *The Kingdoms of the World*, 1911; *Wild Justice*, 1922; *The Grierson Mystery*, 1928; *Peril*, 1929. He collaborated with Austin Strong in plays, *Little Father of the Wilderness*, and *The Exile*. He died May 23, 1947. Stevenson's *Treasure Island* was dedicated to Osbourne.



Lloyd Osbourne, American author

Oscans, OSCO, OR OPICOL. Ancient Italian race, speaking a language akin to Latin, and inhabiting a considerable portion of central and S. Italy.

Oscar. Popular term for U.S. film award, instituted 1931, by the American Academy of Motion Picture Arts and Sciences. It takes the form of a statuette conferred annually in recognition of outstanding achievements in films. "Oscars" are given annually to the most successful actor, actress, director, camera man, and scenario writer of the year. The origin of the term is variously given, but remains obscure. *See Film.*

Oscar I (1799-1859). King of Norway and Sweden, 1844-59. He was born in Paris, July 4, 1799, the son of Marshal Bernadotte, and was created duke of Södermanland on his father's election as crown prince of Sweden, 1810. He was educated at Upp-
sala, and carefully trained as heir presumptive. In 1823 he married Josephine Beauharnais, granddaughter of the Empress Josephine.

Oscar I, King of Norway and Sweden



Oscar I, King of Norway and Sweden

He proved a liberal and strongly anti-German monarch, and granted freedom of the press. He died July 8, 1859.

Oscar II (1829-1907). King of Norway and Sweden. He was born in Stockholm, Jan. 21, 1829, the third son of Oscar I. He entered the Swedish navy as a boy, completed his education at Uppsala, and in 1857 married Princess Sophia of Nassau. He opposed repeated attempts to separate Norway from Sweden made by the Radicals of Norway from 1880, and more than once before the separation of 1905 averted civil war. He used the pen-name of Oscar Fredrik to write in prose and verse, notably a Military History of Sweden. His biography of Charles XII was translated into English, 1879, and his collected writings were published in 7 vols., 1885-1902. He died Dec. 8, 1907.



Oscar II, King of Norway and Sweden

Oschersleben. Town of Saxony-Anhalt, E. Germany, in the fertile Magdeburg plains, 20 m. W. of Magdeburg, on the Bode. It is an ancient town, being the seat of the archbishops of Magdeburg, but many of its old buildings were destroyed by frequent fires. In the 19th and early 20th centuries it was an industrial centre with engineering, textile, and food factories. After the Second Great War it was in the Russian occupation zone. Pop. (1950) 22,400.

Oscillation. Periodic movements of a body or quantity about some average position or value. The conception is of fundamental importance in the whole domain of physics, in engineering, astronomy, biology, and even in economics. Some unification of these diverse types of periodic phenomena is made possible by general mathematical treatment, and various relations and analogies can be found to interlock the examples in different sciences.

The simplest type of periodic motion is simple harmonic (*q.v.*), in which the time period of repetition of a cyclic motion is constant and independent of the amplitude. In the ideal case such a motion is maintained without loss of energy, but in practice some form of dissipation is present; in an electrical circuit it will be the energy lost by heat in the electrical resistance, while in a

mechanical system friction will be the cause. Under these conditions the motion is said to be damped, and a certain amount of stimulus is required to maintain the oscillation; in an electrical circuit this source of energy will come from an applied E.M.F.

If this energy supply is contained within the vibrating system, the oscillations are said to be self-maintained; if the supply is external, they are forced. A particular phenomenon, known as resonance, takes place if the frequency of the applied force coincides with the natural frequency of the system. The amplitude of the motion in these circumstances may build up to large values; this is why marching troops fall out of step when crossing suspension bridges.

A particular type of vibration often met in nature is the relaxation oscillation, and its characteristic feature is a building up of the amplitude to some optimum value followed by an almost instantaneous decay, this sequence of events being repeated within a definite periodic time. In sharp contrast with simple harmonic oscillations, the amplitude of a relaxation system does not exhibit resonance at all. Hence, whereas in simple harmonic motion automatic synchronisation occurs only in a limited region of frequencies near resonance, a relaxation system when subjected to an external periodic force can easily be brought into synchronisation over the frequency range of an octave. Again, when an alternating sinusoidal E.M.F. is applied to a non-linear circuit element it gives rise to currents whose frequencies are multiples of the applied frequency; by contrast, a relaxation system exhibits a frequency which is a sub-multiple of the applied frequency. Examples of relaxation oscillations are heartbeats, flapping of a flag in wind, and periodic flashing of a neon tube.

B. W. B. STEPHENS, Ph.D.

Oscillograph. Instrument for demonstrating visibly the nature of the fluctuations of an alternating electric current. The current to be tested passes through a small coil suspended in the field of an electro-magnet energised by a current of constant intensity. The fluctuations and reversals of current in the coil make it swing to and fro. A beam of light is reflected by a tiny mirror attached to the coil on to a second mirror moving synchronously with the coil, but on an axis at right angles to that of the coil; and thence on

to a fixed screen. The spot of light traces out "wave" curves compounded of the two different motions of the mirrors; and these curves are repeated so rapidly that, owing to the persistence of vision, they appear as continuous lines of light on the screen. These graphs may be recorded on light-sensitised paper or film, inserted in rolls which pass through at a regular speed and which provide a permanent record of the fluctuations. A more sensitive instrument is the cathode ray oscillograph, which uses a stream of electrons with small inertia and is thus able to respond to extremely rapid variations. See Cathode Ray Tube.

Osh. Town of Kirghiz S.S.R. It is in the prov. of Oshsk, 55 m. N.E. of Marghilan, on the river Ak-bura, and is said to have been founded by Alexander the Great. There is a trade with China.

O'Shaughnessy, ARTHUR WILLIAM EDGAR (1844-81). British poet. Born in London, March 14, 1844, he obtained a post in the British Museum in 1861. Afterwards he became an assistant in the natural history department. He died Jan. 30, 1881. His works include *Epic of Women*, 1870; *Music and Moonlight*, 1874; and the posthumous *Songs of a Worker*. A well-known ode is that beginning *We are the Music Makers*, set to music by Elgar. With his wife, Eleanor Marston, whom he married in 1873, he wrote *Toyland*, 1875, children's stories.

Oshawa. Town of Ontario, Canada. It stands on Lake Ontario, 32 m. N.E. of Toronto, and is served by the C.N.R. and C.P.R. It is connected by electric rly. with Toronto. It has a harbour and some major industries, including the main plant of General Motors. Pop. 26,875.

O'Shea, KITTY (1846-1921). Respondent in the Parnell divorce case. Katherine Page Wood married William O'Shea in 1867, but, after the birth of their third child in 1874, husband and wife drifted apart. Her attachment to C. S. Parnell (*q.v.*) led to O'Shea's challenging Parnell to a duel; the quarrel, however, was resolved, and in 1881 Mrs. O'Shea separated from her husband and lived at Eltham with a wealthy aunt. Here Parnell frequently visited her until in 1890 Capt. O'Shea obtained a divorce on the ground of his wife's adultery with Parnell. The scandal that resulted broke Parnell's political career. Mrs. O'Shea married him in 1891, and survived him until Feb., 1921.

Oshkosh. City of Wisconsin, U.S.A., the co. seat of Winnebago co. It stands on Lake Winnebago, 80 m. N.N.W. of Milwaukee, and is served by rlys. and steamers. Lumber products, carriages, wagons, machinery, furniture, tobacco, and flour are among its manufactures. It was originally named Athens, but in 1870 the name of a local Indian chief meaning "claw" or "brave" was substituted. The city was four times rebuilt after fires, 1859-75. Pop. 39,089.

Osier (*Salix viminalis*). Shrub or tree of the family Amentaceae. A native of Europe and N. Asia, it forms either a bushy shrub or a tree 30 ft. high, growing in wet places. The long, straight branches, used for wickerwork, are polished when mature. The leaves are narrow-lance-shaped, the edges waved but not toothed, and silvery beneath. The catkins, which mature before the leaves, are golden yellow. The purple osier (*S. purpurea*) does not attain the tree form, and its slender tough twigs have red or purple bark. Several other willows are grown as osiers by keeping the trunk cut close to the ground, and so inducing a plentiful annual

growth of long slender rods. The osiers are cut in spring, when the bark peels easily, leaving the rods white. See Basket.

Osijek. This town of Yugoslavia is described under its alternative name of Eszék.

Osimo. City of Italy, 8 m. S. of Ancona. It is the ancient Auximum, colonised by the Romans in 157 B.C. Part of the old wall still exists, and there are Roman antiquities from the site of the ancient forum in the Palazzo Pubblico. The cathedral, slightly damaged by shell-fire during the Second Great War when the 8th army entered it July 2, 1944, contains 13th century sculptures.

Silkworm breeding is the most important local industry.

Osiris. Egyptian deity. Originally the local god of Busiris, his worship developed during the Old Kingdom at Abydos, where he was traditionally interred. From being considered a virtuous benefactor, whence Egypt obtained her law and agriculture, he became by assimilation with Ra, a sun-god. He was also identified with other gods, e.g. with Apis as Serapis and with Khons the moon-god. The son of earth and sky, he

was brother and husband of Isis, and father of Horus. His brother Set, god of darkness, put him in a coffin which he threw into the Nile, and afterwards cut his body into 14 pieces and scattered them through Egypt, but Isis collected and scattered them through Egypt, but Isis collected them with one exception, and either buried them separately or resuscitated Osiris by incantations. He was thus god of resurrection and eternal life, and judge of the dead. The righteous soul became an Osiris. As lord of the underworld he appears with a mummified body, wearing a plumed crown, and associated with ideas concerning the after life. Ptolemaic temples were erected to him at Canopus and Karnak. See Amenti; Egypt; Isis; Serapis.

Osler, Sir William (1849-1919). British physician. Born at Bondhead, Canada, July 12, 1849, he was educated at McGill university, London, Berlin, and Vienna. He held university appointments at McGill (1874), Pennsylvania (1884), Johns Hopkins (1889), Oxford (1905). Created a baronet in 1911, Sir William Osler wrote widely and authoritatively on nearly every aspect of medicine. He died Dec. 29, 1919. His books include *Principles and Practice of Medicine*, 14th ed., 1942. *Consult The Great Physician*, E. G. Reid, 1931.

Oslo. The capital of Norway, called Christiania 1624-1924. Picturesquely placed at the head of Oslo Fjord, it was named after King Christian IV of Denmark and Norway, who refounded it in 1624, after the destruction by fire of the old city of Oslo founded by Harald Sigurdson in 1048. Built of wood, Christiania suffered frequently from fires; since 1850 brick and stone have been used. The fortress of Akershus, besieged by



Osier, in winter, showing long straight branches



Osiris as the moon-god

From a statue in the British Museum



Oslo, Norway. Plan of the Norwegian capital at the head of Oslo Fjord



Oslo arms

the Swedes in 1310, by the Danes 1531-33, and again by the Swedes in 1567 and 1716, is now an arsenal and prison. There are old and new bishop's palaces, a royal palace (1821-28), houses of parliament (1866), law courts, a university (1853), a town hall (1931-50), and three museums. The old name Oslo was revived in 1924.

The harbour, formed by two creeks, is generally locked by ice for two or three months during the winter. Shipping and allied trades form the staple industries, but manufactures of paper, leather, soap, matches, linen and woollen goods, tobacco, yarn, spirits, and glass are also engaged in. The motive power for the various factories is derived from the waterfalls of the Akers. The chief exports are wood-pulp, timber, butter, margarine, matches, nails, condensed milk, dried fish, paper, tobacco, hides, seal-skins, ice, and paving stones. It is one of the most valuable ports in the country. There are several fine parks, and a summer palace in one of the many growing suburbs. Oslo has regular steamer communication with several British ports, Amsterdam, and Antwerp, and regular air services with Copenhagen, London, Prague, Frankfurt, and Marseilles. Good roads and several rlys. connect it with Sweden. Pop. 289,000.

On April 9, 1940, without a declaration of war, German warships disembarked troops in the vicinity of Oslo, while troop-carrying planes landed at the airport. The government and royal family moved to Hamar, and by the afternoon the Germans were in possession of the city. Allied aircraft attacked military targets at Oslo during the German occupation, but little damage was done to the city itself. British and Allied delegates arrived at Oslo, May 8, 1945, to receive the capitulation of the German forces in Norway. The Norwegian government returned May 31, the king arriving June 7.

Oslo Convention. Agreement signed on Dec. 22, 1930, by the govts. of Netherlands, Belgium, Luxemburg, Norway, Sweden, and Denmark, for a greater measure of free trade and a lowering of tariff barriers and exchange restrictions between the signatories. The same powers were parties to The Hague agreements (*q.v.*). Finland adhered to the Oslo Convention, Feb. 8, 1933.

Oslo Diet. Semi-vegetarian diet devised by the Norwegian ministry of Health in 1938. It

was adopted by the British ministry of Food in 1942 and given experimentally to a number of school children, their condition being compared with that of a similar number of normally fed children. A typical Oslo meal consisted of a salad of grated raw vegetables, butter, wholemeal bread, fresh fruit, eggs, and milk. Food rationing prevented the Oslo diet from becoming more than experimental in the U.K.

Osman or **OTHEMAN** I (1259-1326). Founder of the Ottoman empire. Born in Bithynia, he succeeded to the leadership of his clan in 1288, and gradually conquered the surrounding Turkish and Tartar tribes. Assuming the title of sultan in 1299, he founded the Osmanli or Ottoman dynasty. *See* Ottoman; Turkey.

Osman Abu Bakr Digna (d. 1926). Dervish chieftain. A Haden-doa slave dealer at Suakin, he was made governor of Eastern Sudan by the Mahdi (*q.v.*), captured Sinkat and Tokar in 1883, and defeated Baker Pasha's troops at El Teh, Feb. 4, 1884, being himself defeated there by General Graham, Feb. 29, and also at Tamai, March 13. Holding the country round Suakin, he was a continual menace to the Sudan. Captured by the British in 1900, he was imprisoned. He died in Dec., 1926.

Osmanthus fragrans. Evergreen shrub of the family Oleaceae, native of Japan and China. It has toothed, lance-shaped, opposite leaves, and yellowish-white, four-lobed, fragrant flowers. The Chinese use the flowers to scent tea.

Osmiridium. Natural alloy of the two rare metals of the platinum group, osmium and iridium. In some places the alloy is found with gold dust, in the form of pale, steel-grey grains. As it is very infusible, heavy, and insoluble in gold, it can be separated easily by simply melting in a cone-shaped crucible, when the heavy alloy settles at the bottom of the cone. Because of its great hardness and resistance to wear, it is used for watch pivots, parts of fine instruments and ships' compasses, and for tips of fountain pen nibs, etc. *See* Iridosmine.

Osmium. A rare metallic element of the platinum group and

the heaviest of all known substances. It was discovered in samples of platinum ore by Smithson Tennant in 1803. Its chemical symbol is Os, and it is one of the transitional elements of the third long period of the periodic table, with tungsten, rhenium, iridium, and platinum. It has an atomic number, 76; atomic weight, 190.2; density, 22.48 gr. per c.c.; resistivity, 9.5×10^{-6} ohm cm; melting point about 2,700° C.; crystal form, close-packed hexagonal, with lattice constants $a=2.7298$ and $c=4.3104$.

The metal, bluish-white in colour with a high lustre, is usually found associated with platinum, and is extracted by a complex process during the refining of the platinum metals. Less important sources are osmiridium and iridosmine, which are natural alloys, recovered from certain ores, such as the gold deposits of the Witwatersrand in S. Africa. It is extremely hard and infusible, being harder than glass and quartz, but it has few uses in industry, owing to the difficulty of working it and its rapid oxidation at high temperatures. The powdered metal can be compacted into a solid and sintered at 2,000° C., under a controlled atmosphere, and it can be plated on to certain of the base metals, such as nickel, copper, brass, or steel, in the form of rod, wire, tubes, and sheet. Osmium was at one time used for the filaments of electric light bulbs. One of its chief uses is as a catalyst, particularly in hydrogenation processes. When heated in air, it forms at 950° C. a poisonous and irritating tetroxide, volatile at 100° C. *See* Osmiridium; Platinum; Powder Metallurgy.

Osmosis (*Gr. osmos*, pushing, impulsion). Physical term. It relates to the flow of a solvent through a semi-permeable membrane by virtue of the existence of osmotic pressure (*v.i.*). The phenomenon plays an important part in animal life, plant physiology, and chemistry. If fruit or vegetables are placed in a sugar or salt solution, liquid may pass out through the skin with consequent shrivelling. On the other hand if placed in fresh water the skin becomes stretched from the inward passage of water.

Osmotic Pressure. Pressure exerted by the particles of a substance in solution. If the solution is dilute and the substance does not dissociate, then it exerts a pressure equal to the



Osman Digna,
Dervish chieftain

gas pressure it would exert if it were a gas at the same temperature, and occupied the same volume. For a non-electrolyte in dilute solution, the osmotic pressure, temperature, and volume obey the ordinary gas laws.

Osmund (d. 1099). English bishop and saint. Count of Sees in Normandy, he accompanied the Conqueror to England and was created earl of Dorset. He is said to have been also chancellor of England. He embraced the religious life, and in 1078 was made bishop of Salisbury, where he built a cathedral at Old Sarum about ten years later. He wrote a Life of S. Aldhelm, and had considerable skill as a copyist and bookbinder. He died in 1099, and was buried in his own cathedral at Old Sarum. Canonised in 1457, his remains were removed to the new cathedral.

Osmunda. Genus of ferns, the most important of which is the royal fern (*q.v.*).

Osmundaceae. A family of Pteridophyta, consisting of two genera only, *Osmunda* and *Todea*. They have creeping rootstocks, and the sporangia are not covered by a pellicle (indusium), and the spore-capsules split into two valves by a vertical fissure, there being no "ring" as in the other ferns. The spores contain chlorophyll, and soon perish if they do not immediately find conditions favourable for germination.

Osnabrück. City of W. Germany, in the *Land* of Lower Saxony. It stands on the Hase, 70 m. W. of Hanover, linked with the Mittelland canal by a branch waterway. Before the Second Great War it possessed many valuable historical buildings, including the huge cathedral, reconstructed after a fire in 1254, the Gothic church of S. Mary (14th–15th century), S. John's church (13th century), the Benedictine convent church (12th century), and the town hall, built between 1487 and 1512. The bishopric was founded by Charlemagne in 783. The town was a prominent member of the Hanseatic League, and its last sovereign was George III's son, Frederick, duke of York. It became a part of Hanover, and merged with Prussia in 1866. Pop. (1950 est.) 97,000. Bombed repeatedly and badly damaged by Allied aircraft during the Second Great War, it was captured by the British 1st commando bde., April 5, 1945, and after the war it lay in the British zone of occupation, coming within the region of Niedersachsen.

Osorno. Town and volcano in Chile. The town is the capital of the prov. of Osorno, 50 m. S.E. of Valdivia on the rly. from Puerto Montt to Santiago, in the middle of an important agricultural and industrial dist. It has trade in cereals, flour-mills, and distilleries. The volcano, 8,725 ft. alt., lies 40 m. S.E. of the town W. of the lake Todos los Santos.

Osorrei. Town of Rumania, sometimes known as Maros Vársárhely, Targul Mures, or by its German name Neumarkt. It stands on the Maresul (Maros) in Transylvania, 80 m. by rly. from Cluj (Kolozsvár), and is the capital of Szeklerland. It contains the Teleki Library and the Szekler National Museum. There are timber and petroleum industries, and sugar, tobacco, tiles, spirits, and pottery are manufactured. Pop. 44,946.

Osprey (Lat. *ossifraga*, bone-breaker). Bird of prey (*Pandion haliaetus*), known also as the fish-



Osprey. Species of the bird found in Australia

ing hawk. It is about 2 ft. long, the back and wings are dark brown, the crown of the head and the throat whitish, and the under parts white. It is found in nearly all parts of the world, except in deserts and near the Poles, but is rare in Great Britain and was last recorded as breeding in 1908 in a secluded district in N. Scotland. The nest, a very large structure of sticks lined with moss, is usually built in a tree, but where trees are scarce may be made on the ground or on the ledges of cliffs. It is always found near water, as the bird's food consists entirely of fish. The osprey soars to great heights, watching for its prey, on sight of which it darts down with great speed and seizes it with its claws. The so-called osprey plumes of commerce were taken from a species of aigrette (*q.v.*).

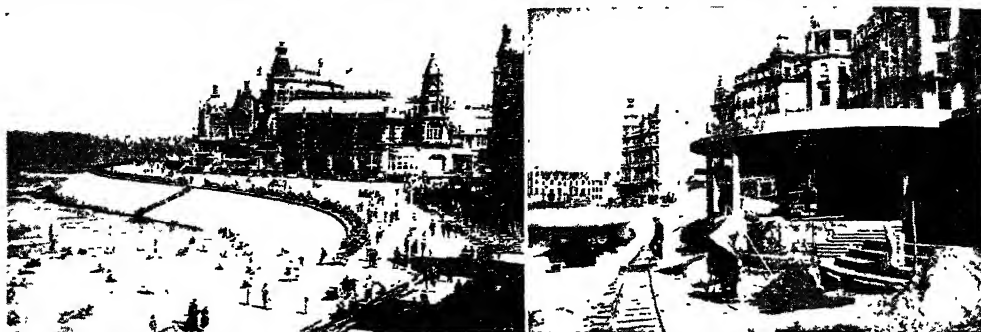
Ossa. Mountain of Greece, in Thessaly. It rises E. of the river Peneus, and with its neighbouring height of Pelion (*q.v.*) is separated from Olympus by the vale of Tempe. The chief peak is 6,398 ft. high, and now known as Kissavos.

Osservatore Romano (The Roman Observer). Only daily newspaper published within the Vatican city. It was founded 1890 and is an Italian language paper. It publishes the Vatican court circular and much ecclesiastical news. General news, comments, and articles do not necessarily represent the official point of view of the Church, yet are assumed to be consistent with the attitude of Vatican circles. It circulates among parish priests and missions all over the world, but since the end of the First Great War it has also been sold by the newsagents of Italian cities and of the capitals of R.C. countries. As the Fascist control of the Italian press grew tighter, it became the only paper in Italy providing independent news and comment. In the late 1930s its circulation soared into hundreds of thousands. Mussolini's regime protested and the paper suppressed its comments on foreign affairs.

Ossetia. Part of the R.S.F.S.R. situated in the Middle Caucasus, on both slopes of the Dariel Pass. N. Ossetia is an A.S.S.R., and S. Ossetia is a province of the Georgia S.S.R. The people, known as Ossets, are tall, frequently light-eyed and blond-haired, and of Iranian speech. Their beliefs in primitive animism were maintained more persistently than in any Aryan people outside India.

Ossett. Mun. bor. of Yorkshire (W.R.), England. It stands near the Calder, 3 m. from Wakefield, with a rly. station. The town is mainly concerned with the textile trade and coal mining, but there are also engineering factories. The fine church of Holy Trinity is modern. At South Ossett are mineral springs. Ossett was made a bor. in 1890, the municipality including Gawthorpe. Market day, Fri. Pop. 14,000.

Ossian (Ir. *Oisín*). Irish hero and bard of the 3rd century. The son of Finn Mac Cumhal, he is traditionally the great poet of the Gaels, and is himself a prominent figure in hundreds of ballads and tales from the 12th to the 18th century. His fame spread to the Scottish Highlands. He fled after the Fenian defeat at Gabhra in 293. A variant of a widespread fairy tale relates that he was lured away



Ostend, Belgium. Left, the Kursaal and Digue promenade before the Second Great War. Right, reconstructing the latter after the German occupation. The site of the Kursaal, destroyed by Germans, is on the extreme left

by the daughter of the king of the Land of Youth, where he spent 300 years, and on his return became old and decrepit. Meeting S. Patrick, he recounted the events of the past to him. See Finn; Gaelic Language and Literature; Macpherson, J.

Ossietzky, CARL VON (1889–1938). German pacifist. He was born at Hamburg, Oct. 3, 1889, and was early prominent in the German pacifist movement. In 1928 he became editor of the Berlin weekly *Die Weltbühne*. He published detailed accounts of various infringements of the Versailles Treaty, and was sentenced to 18 months' imprisonment for treason. Oct. 23, 1931. Released under amnesty in 1932, he was later sent to a concentration camp by Hitler. He was awarded the 1935 Nobel peace prize, and as a result of this Hitler decreed that no German was in future to accept a Nobel prize. In consequence of ill-treatment, Ossietzky died of tuberculosis, May 4, 1938. After the Second Great War his journal was revived and edited in Berlin by his widow.

Ossification. Formation of bone. Natural ossification is the process by which the cartilage formed in the developing organism *in utero* is gradually converted into bone, and the primitive tissue of the skull is formed into the bones of the skull. Ossification also occurs in the process of repair of fractured bones, a mass of new bony tissue called callus being formed between and around the broken surfaces. In certain diseases of the joints ossification of tissue occurs, and in extreme cases the articular surfaces may become firmly united, and all movement in the joint lost. See Bone.

Ossington, JOHN EVELYN DENISON, VISCOUNT (1800–73). British politician. Born at Ossington, Nottinghamshire, Jan. 27, 1800,

and educated at Eton and Christ Church, Oxford, in 1823 he became Whig M.P. for Newcastle-under-Lyme. He was Speaker of the house of commons, 1857–72, when he retired and was created Viscount Ossington. The title became extinct on his death, March 7, 1873. The Speaker's Commentary on the Bible was brought out at his suggestion.

Ossipevsk. Town of Ukraine S.S.R. Formerly known as Berdichev, it is 120 m. W.S.W. of Kiev on the Brest-Litovsk rly. An important junction and industrial centre, its chief trade is in grain, cattle, and horses. In the treaty of demarcation between the Poles and Lithuanians in 1546, the town was assigned to Lithuania. It fell to Russia by conquest in 1768. During the Second Great War it was occupied by the Germans early in their 1941 campaign, and recaptured by the Russians Jan. 5, 1944, after five days' violent fighting. Pop. 66,306.

Ossory. Name of an old Irish kingdom. It existed for nearly 1,000 years, falling to pieces just before the English conquest of Ireland in the 12th century. It was part of the modern province of Leinster, roughly that now covered by Offaly, Leix, Kilkenny, and Carlow. In 1527 Piers Butler, afterwards 8th earl of Ormonde, was created earl of Ossory, and the title is still borne by the marquess of Ormonde.

Ossovietz. Town and fortress of Poland, also known as Oswiec. It is on the river Bobr, 30 m. N.W. of Bielystok. Its position in the valley of the river, dominating railways and important roads, rendered it of strategic importance during the First Great War. It was besieged by the Germans from Sept. 25 to Oct. 2, 1914, and again during Feb. and March, 1915, but the Russian garrison held it until the general Russian retreat in August.

Ostade, ADRIAN VAN (1610–85). Dutch painter. Born at Haarlem, he studied under Frans Hals (*q.v.*), and spent the whole of his life at Haarlem, dying there April 27.



A. van Ostade. A peasant scene, portrayed by this Dutch genre painter

1685. A prolific painter of peasant genre, he was influenced in turn by Adrian Brouwer and Rembrandt. His brother Isaac (1621–49) painted landscapes.

Osteitis. Inflammation of compact bone. The term osteomyelitis is used when the central or medullary cavity of the long bone is involved. The commonest cause is injury to the bone, with or without an open wound. An acute inflammation of the bone sometimes occurs in children, and may follow scarlet and other fevers. Chronic inflammation may follow an acute attack of inflammation or tuberculosis or syphilis. Penicillin and the sulpha drugs have altered the treatment and outlook.

Ostend (Flemish, *Oostende*). Town of Belgium, in the prov. of W. Flanders. It lies in flat country on the N. Sea coast, 14 m. W. of Bruges, with which it is connected by rly. and canal. Ostend is the principal sea-bathing resort of Belgium, attracting visitors from many countries, and possesses a large kursaal, racecourse, theatres,

and many other attractions. The digue, which forms the chief promenade, stretches to Mariakerke, 3 m. to the W. It harbours the principal fishing fleet of the seaboard, is a seaport of importance with cross-Channel service to Dover, and is the terminus of express lines to many parts of Central Europe. Its oyster-beds are famed, and there is a local lace industry. The town is mostly modern. The hôtel de ville is an early 18th century building on the Place d'Armes; the large modern Gothic church of S. Peter and S. Paul was built in 1907. The Parc Léopold, with ornamental water-lilies in the centre of the town.

Ostend is recorded as connected by canal with Bruges as early as 1284; as a port and fishing harbour it dates from the 16th century. It suffered severely in the long siege of 1601-4, when it was captured by the Spanish general Spinola. Its fortifications were demolished in 1865. In the First Great War it was occupied by the British until Oct. 14, 1914, when the Germans captured it and converted it into a naval base. On April 22, 1918, an expedition set out from Dover to block the harbours of Ostend and Zeebrugge, but was foiled by a change of wind which dissipated the smoke-screen. A second attempt was made on the night of May 9-10. A cruiser was filled with concrete, and her captain attempted to push into the harbour and scuttle her in the entrance. The attempt was not completely successful, and the Germans were able to keep open a channel about 30 ft. wide. (See Keyes, Baron; Vindictive.)

In the Second Great War the Germans bombed Ostend on May 28, 1940, and took it the next day. As a seaplane base and potential invasion port it became a target for the R.A.F., and was bombarded by units of the Royal Navy, Feb. 11, 1941. The Canadian 18th armoured bde. entered it Sept. 8, 1944, the Germans having left.

Ostend Company. Trading company with headquarters at Ostend and stations on the Indian coast, established in 1717 for eastern trade, under the patronage of the emperor Charles VI. Its success aroused the jealousy of England, the Netherlands, and others, which united to force its dissolution. In 1727 the emperor suspended its Charter, and the company ceased to exist in 1731.

Osteology (Gr. *osteon*, bone; *logos*, science). Science pertaining to bones. See Bone; Skeleton.

Osteopathy (Gr. *osteon*, bone, *pathos*, suffering). Term used for a disease of a bone. It also refers to the treatment of bone disorders by a process of manipulation. The U.S.A. is the home of the skilled osteopath, but many registered medical practitioners in Great Britain have graduated in this branch of knowledge. There can be little doubt that adjustment of an unbalance of the bony framework of the body may result in the alleviation or cure of many pathological conditions. See Bone.

Ostergötland or **LINKÖPING**. Län or co. of Sweden. It lies between the Baltic and Lake Vätter (Wetter) and contains many lakes, of which the largest is Lake Sommen. The river Motala drains a fertile plain. Cheese is the main farm product, and there are copper and iron mines. Linköping is the chief town and rly. junction. Area, 4,266 sq. m. Pop. 332,933.

Osterley. Residential suburb of London. Situated in the boroughs of Heston and Isleworth, Middlesex, it is one m. N.E. of Hounslow and is served by London Transport's Piccadilly-Hounslow line. It takes its name from the mansion of Sir Thomas Gresham (1519-79). This was rebuilt for Francis Child, the banker, by Robert Adam, and later became the seat of the earl of Jersey. The only remains of the original house are the Elizabethan stables. An offer, 1946, of the estate to the National Trust was withdrawn 1948; but in 1949 the Trust accepted the gift of Osterley house and 140 acres of the park. The house was leased to the Ministry of Works as a public museum, and was placed in the charge of the Victoria and Albert Museum.

During the Second Great War the grounds were used as a battle school for the Home Guard.

Osterode. Tn. of Lower Saxony, W. Germany, in the Harz mountains, on the river Söse, 20 m. N.E. of Göttingen. Its ancient buildings have included the church of S. Giles, built 724 and destroyed and rebuilt in the 16th century; a castle dating from the early 12th century; and various warehouses,

etc., used in the medieval corn trade. Its main industry has been the manufacture of textiles. After the Second Great War it was in the British zone. Pop. (1939) 7,882; (1949) 14,200.

Osterode (Pol. Ostrodá). Town of Poland, in the prov. of Masuria. It is 22 m. W. of Allenstein (Olsztyn), on lake Drewenz. It was formerly a centre of the timber and brick trade of the neighbourhood. It lies in the part of the former German prov. of E. Prussia taken over by Poland in 1945. Pre-war pop. 16,583.

Ostersund. Town of Sweden. Situated on the E. side of Lake Storsjö, in the län or county of Jämtland, it is joined with the island of Frösö by a bridge 1,420 ft. in length. It is a centre for the timber trade. Pop. 17,782.

Östfold. County of Norway. Its western coast forms part of Oslo fjord, and it is bounded on the E. and S.E. by Sweden. It is the smallest of Norwegian countries except Vestfold. Mainly agricultural, it has a somewhat milder climate than other parts of southern Norway. The chief towns include Fredrikstad, Sarpsborg, and Mysen. Östfold has an area of 1,614 sq. m. Pop. 175,915.

Ostia. Ancient port of central Italy, 14 m. S.W. of Rome, said to have been founded by Ancus Marcius. It was the port of Rome and



Ostia, Italy. The ruins of the semi-circular theatre with the remains of the temple beyond, which formed part of this ancient port of Rome

stood on the S. arm of the Tiber. The old town was covered by sand in the course of centuries; its excavation started in the late 19th century. It was a city of c. 100,000 inhabitants, closely knit with the life of Rome itself.

An early Roman fort of c. 330 B.C. was the nucleus around which Ostia developed. A grain-importing port in the 3rd century B.C.,

under Sulla it was given new walls; a Republican temple and other buildings have been found. Because of the silting-up of the S. arm of the Tiber, Claudius built in A.D. 42 a new harbour $2\frac{1}{2}$ m. to the north, Portus Ostiae or Portus Augusti, with lighthouse and moles. Trajan (100-106) added a new hexagonal basin. But the main town retained its commercial importance until the 4th century.

Medieval Ostia was founded in 830 by Gregory IV close to the ancient town. The Castello was built 1483-86, but its prosperity disappeared when the N. arm of the river was reopened in 1612.

The excavated buildings of Roman Ostia include the forum with capitolium and basilica; baths; theatre; with an adjoining square where mosaics in the surrounding arcades mark the offices of trading corporations from all over the world of the day, e.g. the S. of France, Carthage, and Alexandria; grain warehouses; shops; temples; and a Christian church of the time of S. Augustine. Specially important are the large urban *insulae* or house blocks with great apartment houses of which 3rd and even 4th storeys can be traced.

Ostland (Ger., eastland). Name given by the Germans to the territory set up by them in July, 1941, comprising part of N.E. Poland, White Russia, and the Baltic states of Estonia, Latvia, and Lithuania. Alfred Rosenberg was made Reichsminister for Ostland and the Ukraine, and Heinrich Lohse was appointed Reichscommissar for Ostland, with headquarters in Kovno.

Ostmark, Dm. Name given by National Socialist Germany to the country of Austria on its incorporation into the German Reich, March 13, 1938. The name means East March. See Austria.

Ostraca (Gr., hard shells). Inscribed potsherds and stone slabs, principally from ancient Greece and Egypt. The British Museum contains one of those whereby Themistocles was ostracised in 471 B.C. The name has been transferred to the pottery fragments and limestone slabs, employed in Egypt for ephemeral ink-records. Many thousands have been collected, bearing Aramaic, Greek, Egyptian, and Coptic records ranging from 400 B.C. to A.D. 900. At the Arab conquest three Christians copied the Greek gospels on numbered potsherds, whereof 20 remain. See Graffiti.

Ostracism. Political practice introduced by Cleisthenes at

Athens in 508 B.C., and subsequently employed in other Greek states. Once a year every Athenian citizen had the privilege of writing on an oyster-shell (*ostrakon*) the name of any statesman whom he thought it would be desirable to send into exile. In the event of there being 6,000 votes adverse to any statesman, the decree of banishment, or ostracism, as it came to be called, took effect. The period was first for 10 years, and subsequently for five. It did not involve any loss of civic rights, and the victim could be recalled before the end of his term of exile. Noted Athenians who suffered ostracism were Miltiades, Themistocles, Aristides, Cimon, and Alcibiades, by the last of whom the practice was abolished. See Greece.

Ostracoda. A class of small crustaceans. The body is unsegmented and enclosed in a bivalve carapace from which the head does not protrude. They swim by means of their antennae, which are jointed and have brush-like terminations. In some species the eggs are carried about in the shells, and in others are laid on water plants. Most of them live in the sea, but a few species are found in fresh water, as the common cypris of British ponds. They are all carnivorous and play an important part as scavengers.

Ostrava Moravska. Town of Moravia, Czechoslovakia. It was formerly in Austria and was then known as Mährisch-Osttau (Moravian Ostrava). It is situated 19 m. E.S.E. of Troppau, on the E. bank of the Ostrawitz, a tributary of the Oder, and the centre of an important industrial area. Owing to its position on a leading coalfield, it has numerous iron-works, blast furnaces, and coke ovens. Its manufactures include soap, petroleum, chemicals, and candles. Among its institutions is a mining academy. Pop. 175,639.

During the Second Great War, when Ostrava Moravska was in German occupation, it was attacked from the air by the Allies. Ukrainian and Czechoslovak troops liberated it April 30, 1945.

Ostrer, ISIDORE (b. 1889). British financier. One-time senior partner in the banking house of Ostrer Bros., he was for a time proprietor of the Sunday Referee newspaper, and until 1941 chairman of the Gaumont-British picture corporation. He wrote extensively if unorthodoxly on economics. His brother Mark was a leading figure in the British film industry, chairman or managing

director of many companies including Gaumont-British and Gainsborough. Another brother, Maurice, also on the board of most of these companies, produced films, including *We Dive At Dawn*, 1942; *The Man in Grey*, 1943.

Ostrich (*Struthio camelus*). Largest living bird. Found wild in Africa, Arabia, and Iraq, it is



Ostrich. Specimen of the African ostrich
Gambier Bolton, F.Z.S.

usually placed in the super-order Palaeognathae, the breastbone lacking the keel to which the strong flight muscles of most birds are attached. The wings of the ostrich are small and useless for flight. A fine specimen stands nearly 5 ft. high at the back, and its neck accounts for about 3 ft. more. In the male the plumage of the body is black, with white plumes on the wings and tail, that of the female being grey. The neck is covered with down. The legs, which are long and strong, and part of the thighs, are bare, and the feet have only two toes—a feature peculiar to these birds. The head is relatively small, and is broad and flattened. The beak is short and broad, and the gape very wide.

Ostriches are found in open country, especially desert. Their speed when running with outspread wings exceeds that of any mammal; but their habit of running in great circles enables a well-mounted hunter to get within shot by cutting them off. They feed mainly on grass and leaves, but are practically omnivorous, and will swallow small mammals, birds, or reptiles. The cock bird, in the breeding season, runs with three or four hens, which lay in a common nest consisting of a shallow hole in the sand scraped by the cock. There are usually about 20 eggs in a nest, but the birds often lay a few round it which fail to be hatched.

During the day the eggs are usually left to the heat of the sun,

but the cock incubates them at night. In cooler weather he sometimes sits during the day as well, and is then relieved by the hens while he goes in search of food. The birds are extremely wary, and make off at the least alarm; but a male bird, if cornered, is a dangerous foe, as he can strike terrible blows with his powerful legs. The flesh of the ostrich, except when young, is unfit for food, but the eggs are highly prized by the natives.

Owing to the value of its plumes the ostrich was formerly hunted to extermination in many districts, but the same cause has now saved it from extinction. The establishment of ostrich farms dates from about 1867, and has now developed into an important industry in S. Africa, Australia, the U.S.A., Algeria, and Argentina; but attempts to introduce it to Europe have not proved very profitable.

The birds are given a free run over a large extent of open ground, and pick up most of their food. The plumes are taken usually three times in two years, the birds being driven into small enclosures and hooded to keep them quiet. The feathers are then cut 2 ins. from the sockets, which causes little or no pain to the birds. See Australia; Cassowary.

Ostrog. Town of Ukraine S.S.R. It is in the region of Volynsk, on the river Goryn, 120 m. N.E. of Lvov. There is trade in corn, wool, leather, timber, and sugar. Here the first complete old Slavonic translation of the Bible was issued in 1581.

Ostrogoths. Eastern branch of the Gothic people. It was formed of those Goths who remained in their homes on the Dnieper when the others, who were called Visigoths, moved W. in the 3rd century. The Ostrogoths, under Hermanaric, ruled eastward to the Don, and their supremacy was recognized far to the N.; but they were overthrown by the Huns, after whose fall they began a new era of conquest. Their power was at its highest under Theodoric. See Belisarius; Goths; Hermanaric; Rome; History; Theodoric; Totila; Visigoths.

Ostrolenka. Town of Poland. It stands on the Nareff and the Nareff rly., 20 m. S.W. of Lomza. Agriculture, hunting, and fishing are the chief occupations of the dist., where much amber has been found. Here the Russians were defeated by the French in 1807,

and the Poles by the Russians in 1831.

Ostrovsky, ALEXANDER NIKOLAEVITCH (1823-86). Russian dramatist. Son of a lawyer, he was born at Moscow, March 31, 1823, and educated at the university there. He worked as a clerk at Moscow's juvenile court and commercial court, an occupation which provided him with material for many of his 50 plays, between 1847 and 1886. The first of his plays to attract attention was *The Bankrupt*, 1850, which was banned until 1860. It was later renamed *It's All a Family Affair*. Of plays dealing with the lives of the *petit bourgeois* the best-known included *Everyone in his Own Place*, 1853; and *The Storm*, 1860 (translated into English by C. Garnett in 1898). He also wrote several historical dramas. He became director of the Moscow Theatre and the school of dramatic art, both of which he helped to found. He died May 28, 1886. English versions of his plays, e.g. *Wolves and Sheep*, *Larissa*, *It's All a Family Affair*, and *The Diary of a Scoundrel*, have been produced in London.

Ostuni. City of Italy, in Apulia. It is 22 m. by rly. N.W. of Brindisi. The cathedral has a Gothic façade; the town library contains a valuable collection of antiquities.

Ostwald, WILHELM (1853-1932). German chemist, born at Riga (now in Latvia S.S.R.), Feb. 2, 1853. He was professor of physical chemistry at Leipzig, 1887-1906, and in 1909 was awarded the Nobel prize for chemistry in recognition of his experimental work mainly in the sphere of electro-chemistry. His discovery that oxides of nitrogen could be formed by oxidising ammonia proved of great value to German manufacturers of explosives in the First Great War. His works included textbooks on general chemistry and inorganic chemistry. He died April 4, 1932.

His son, Wolfgang Ostwald (b. June 27, 1883, at Riga), studied at Berkeley university, Calif., U.S.A., lectured on biology at Leipzig, and held there from 1922 the first chair in colloidal chemistry. This

branch of science, which resulted chiefly from the work of Thomas Graham, was fully developed only by Ostwald, whose books on it became international standard works.

Ostwald's Process. Method of oxidising ammonia to form oxides of nitrogen from which nitric acid and nitrates are made. Wilhelm Ostwald, while professor of chemistry at Leipzig, worked out a process in 1900 by which a mixture of ammonia and air is passed over a catalyst, consisting of platinum with a specially prepared surface. The use of this process and the modifications developed during the First Great War enabled Germany to continue making explosives after the Allies had cut off the import of Chilean nitrate.

Ostyak or **OSTIAK.** Tartar name, meaning barbarian, for three primitive tribes in W. Siberia. The Ugra, of Finno-Ugrian stock and speech, numbering perhaps 18,000, inhabit the Ob and Irtysh banks between Tobolsk and Tomsk. The Samoyedic Ostyak, northward to the Taz basin, are properly Samoyeds. The Yenisei Ostyak, a few hundreds, preferably called Yeniseians or Tubas, are aboriginal fishers and hunters, retaining an archaic Tibeto-Chinese dialect. Shamanism prevails in all the tribes.

Osuna. Town of Spain, in the prov. of Seville. It is built on a hill on the edge of the plain of the Guadalquivir, 51 m. E. of Seville. Woollens, soap, and hats are manufactured. The castle and Gothic collegiate church crown the hill. The castle has been, since 1562, the seat of the dukes of Osuna, of whom the third, Pedro, 1579-1624, achieved military distinction under Philip III; the church was built in 1534 on a Moorish substructure. The town was captured from the Moors in 1240. The university, founded 1549, was suppressed in 1820. Pop. 17,700.

Oswald (d. 642). King of Northumbria and saint. A son of King Ethelfrith of Bernicia, he passed some years in exile, being at one time in Iona. Returning to Northumbria, where a British king had killed his brother, he crushed the invaders near Hexham in 635 and became king of both Bernicia and Deira. On Aug. 5, 642, he was defeated and killed at Oswestry by Penda, king of Mercia. Oswald is chiefly known for his efforts to promote Christianity, one of his acts being to found the bishopric of Lindisfarne. He made his kingdom for a short time the most powerful in the land.



Wilhelm Ostwald,
German chemist

Canonised, Oswald has a festival which is celebrated on Aug. 5.

Oswald (d. 992). English prelate. A nephew of Archbishop Odo of Canterbury, who educated him, he went to France and became a monk, but was recalled about 959 and made bishop of Worcester. He founded Ramsey Abbey, Hunts, and became arch-

Lawrence to meet Wolfe at Quebec; in 1766 Sir William Johnson received here the submission of Pontiac; and it was captured by the English in 1814.

Oswego Tea (*Monarda didyma*) OR BEE BALM. Perennial herb of the family Labiatae, native of N. America. It has square, somewhat hairy stems, and opposite, oval-lance-shaped, bristly leaves, which have a mint-like odour. The bright scarlet, two-lipped, tubular flowers are arranged in one or two whorls. The bracts beneath the flowers are coloured red. The folkname indicates a use that is sometimes made of its leaves.

Oswell, WILLIAM COTTON (1818-93). British hunter. Born at Leytonstone, April 27, 1818, he entered the East India Company's service in 1837, and spent ten years at Madras, where he developed a gift of acquiring native languages and became a skilful elephant catcher. Visiting South Africa for his health, he spent two years exploring and hunting, accompanying Livingstone in 1849 on the journey in which Lake Ngami was discovered. Oswell hunted much big game during this expedition, as also in 1851, when he and Livingstone discovered the Zambezi. After wanderings through N. and S. America, 1855-56, he settled in England, where he died May 1, 1893.



W. C. Oswell,
British hunter

Oswestry. Mun. bor. and market town of Shropshire, England. It lies 17 m. by rly. N.W. of Shrewsbury. Historical associations start in 642, when Oswald of Northumbria was slain here by Penda of Mercia. The town grew up round a monastery; it had a Norman castle, now destroyed, to watch the Welsh border; and was made a corporate town in the 12th century. The chief building is S. Oswald's



Oswestry, Shropshire. Parish church of S. Oswald, restored 1893-94

church, restored in the 19th century. There are a town hall, corn market, and grammar school. Locomotives and wagons, agricultural machinery, and aluminium goods are made, and malting and tanning carried on. Market day, Wed. Pop. 9,754.

Oswiecim OR AUSCHWITZ. Town of Polish Silesia, 33 m. W. by S. of Cracow. During the Second Great War it was captured Jan. 27, 1945, by the Russians, and found to have been the site of the worst of all German "extermination camps." With space for 250,000 inmates, this group of camps had gas chambers which could kill thousands daily, and a crematorium which could dispose of 280,000 corpses a month. It is estimated that nearly a million men, women, and children were destroyed there at Himmler's orders during 1939-45 by "cyclone" gas, which killed within 10 minutes; victims were sent into the chambers in herds, having been stripped of clothes, rings, gold teeth, hair, and any artificial limbs. Doctors carried out experiments on inmates of the camp, e.g. in sterilisation of women, artificial infection with cancer, outside the range of civilised practice. Joseph Kramer (q.v.) was at one time commandant. Rudolf Hoess, who later commanded, was executed April 15, 1947, and the camp was turned into a museum. *Pron.* Os-we-ett-sim. See Concentration Camp.

Otago. Largest province of South Island, New Zealand. It has Canterbury prov. on the N.E. and Westland on the N.W., and stretches to the Southern Ocean, including the old prov. of Southland. In the N.W. it is mountainous, containing a section of the Southern Alps, from which drains the river system of the Clutha connected with the lakes Wakatipu, Wanaka, and Hawea. The rainfall varies greatly: in the W. it exceeds 100 ins. annually; near Dunedin, the capital, it is 30 ins.,



Oswego Tea. Stem with leaves and flower whorls of the N. American herb

bishop of York in 972, but still retained charge of the diocese of Worcester. An energetic prelate and a great encourager of learning, he died Feb. 29, 992.

Oswaldftwistle. Urban dist. of Lancashire, England. It is 3 m. E. of Blackburn, on the rly. and the Leeds and Liverpool Canal. The chief industries are the making of cotton goods, chemicals, paper, and pottery, while around are stone quarries and coal mines. The district of Peelford is known for its association with the Peel family. Pop. 12,090.

Oswego. City of New York, U.S.A., the co. seat of Oswego co. It stands at the mouth of the Oswego river on Lake Ontario, 36 m. by rly. N.N.W. of Syracuse, and is served by the New York Central and Hudson River and other rlys., and by the New York State Barge Canal, of which it is a terminus. A port of entry, it has a good harbour with accommodation for large vessels, and carries on a trade in coal, lumber, and grain. Manufactures include starch, corn-flour, pumps, engines, boilers, tools, woollen goods, hosiery, matches, and boxes. A fall of 84 ft. in the Oswego river furnishes water power. Pop. 22,062.

Founded in 1724, Oswego was incorporated in 1828, and became a city in 1848. An important strategic point during the various American wars, it was fortified in 1755, but captured and demolished by Montcalm in 1756. In 1759 Amherst left here with 10,000 men on his journey down the St.



Oswestry arms

and between Queenstown and Amaru is the driest part of New Zealand, a semi-desert with less than 20 ins., where irrigation is essential. Wheat and oats are grown and sheep are reared. Gold is dredged from the Clutha gravels. Rlys. connect Dunedin with Christchurch, Bluff, and the Clutha. The estuary at Dunedin is called Otago Harbour. Otago university is at the capital.

Settlement began in 1848, when a number of Scots landed under the auspices of the Free Church of Scotland. Southland prov. was separated from Otago in 1861, in which year gold was discovered at Gabriel's Gully. Provincial administration ceased in 1875. The first shipment of frozen meat left Port Chalmers in 1882. The area of Otago is 25,220 sq. m. Population 214,213.

Otalgia (Gr. *otos*, of the ear; *algos*, pain). Ache or pain in the ear. Application of glycerine and carbolio or other dehydrating substance may relieve distress until the cause is found and cured.

Otaru. Seaport of Japan, in Hokkaido. Shut in by hills, N., W., and S., the town faces the sea on the E.; the harbour is protected on the N.W. by a small pen., to which a long breakwater has been added. A business centre and a seaport, it has considerable trade with Honshu, Karafuto (Sakhalin), and Asiatic Russia. Close by are the Temiya coal pier and the Takashima marine products experimental station. The port is on the main rly. line of Hokkaido, 20 m. N.W. of Sapporo, the capital, and 159 m. N. of Hakodate. In 1872 it was a fishing village with 4,000 inhabitants. Pop. (1939), 153,587.

Otavi. Mining centre of Damara-land, S.W. Africa. It is connected by rail with the coast at Swakopmund and Walvis Bay. In the neighbourhood are rich deposits of copper and lead, worked by the Otavi Mining and Railways Co. at 5 centres—Tsumeb, Guchab, Great Otavi, Asis, and Otavi Valley.

Otello. An opera by Verdi. Founded on the Shakespearean tragedy *Othello* (*q.v.*), the libretto by Boito was set in 4 acts, and the music composed by Verdi. Considered one of his finest operatic feats, it was produced at La Scala, Milan, Feb. 5, 1887. Its first performance in England was at the Lyceum Theatre, London, July 5, 1889, and it was first sung in English by the Carl Rosa Company in 1895. Rossini composed an opera of the same name, first given at Naples in 1816.

Otford. Village of Kent, England, 2½ m. N. of Sevenoaks. The Pilgrims' Way runs by towards Wrotham. The Romans encamped along the banks of the Darent, and Offa, king of Mercia, fought a victorious battle here. Dane's Hollow commemorates a battle fought by Canute. There are impressive ruins of a Tudor palace where Henry VIII stayed on his way to the Field of the Cloth of Gold; this palace, rebuilt by Warham, was one of the 16 houses of the archbishops of Canterbury from Becket to Cranmer. Otford has a rly. station. Pop. 1,314.

Othello, THE MOOR OF VENICE. Tragedy by Shakespeare. It presents the story of Othello, a noble Moor in the army of Venice, and the poisoning of his mind against his faithful wife Desdemona, daughter of a Venetian senator, by the evil cunning of his trusted ancient (standard-bearer), Iago, one of Shakespeare's outstanding villains. Othello kills his wife by smothering her; then, convinced of Iago's perfidy, kills himself.

The play, the most symmetrical of Shakespeare's tragedies, is mainly domestic. It was written about 1604, acted at Whitehall, Nov. 1, 1604, and printed in quarto 1622 and 1630, and in the first folio of 1623. Based on Cinthio's *Hecatommithi*, iii, 7, and in 5 acts, its text varies, but as usually printed it contains 3,324 lines, including 541 of verse, 2,672 of blank verse, and 86 pentameter rhymes. Most leading Shakespearean actors have essayed the part of Othello; but apart from Edmund Kean, at Drury Lane, May 5, 1814, and Henry Irving, who alternated the parts of Othello and Iago with Edwin Booth, at the Lyceum, 1881, the outstanding modern interpreters of the Moor were Italian—Salvini, at Drury Lane, 1875; and Grasso, at the Lyric, 1910. See *Desdemona*; *Iago*.

Otho, MARCUS SALVIUS (32–69). Roman emperor, born April 23, 32. He was sent as governor of Lusitania in 58 for refusing to divorce his wife at Nero's command. He joined Galba in the rising against Nero, but, disappointed at not being designated as Galba's successor, took advantage of the latter's unpopularity to form the conspiracy which resulted in his murder. Otho was proclaimed emperor Jan. 15, 69, but Vitellius was also proclaimed by the legions in Germany. The rival forces met at Bedriacum, where Otho was defeated, and on April 16 he put an end to his life.

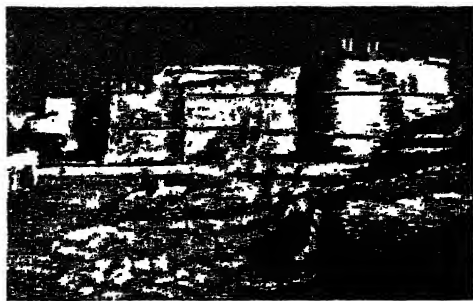
Otira Gorge. Pass in the Southern Alps, New Zealand. Connecting the provinces of Canterbury and Westland in South Island, it rises to a saddle, Arthur's Pass, 3,030 ft., between peaks, of which Mt. Barron on the S. has an alt. of 5,660 ft. Since 1866 the gorge has been crossed by a road made in the days of the boom of the Westland gold diggings and since used by coaches. A tunnel 5½ m. in length was cut, and a rly. runs through the gorge.

Otitis. Inflammation of the organ of hearing. It may attack the outer ear, the middle ear, or the internal ear, and in all cases it produces deafness. In the two former conditions the trouble is known as conduction deafness; in the latter as nerve deafness. These two varieties can easily be distinguished by holding a vibrating tuning-fork opposite the ear. When the note is just inaudible in this position, the end of the fork is placed on the bone behind the ear. If it is again heard, conduction deafness is indicated; otherwise nerve deafness.

External otitis is an inflammation of the skin of the outer ear. There is some discharge from the skin of clear fluid containing scales, which are moistened and loosened by the discharge. The deafness is slight. There is some pain, but more often considerable itching in the ear, which should be heated with soothing disinfectants.

Otitis media is an inflammation of the middle ear. It may be a dry or moist inflammation without the formation of pus (catarrhal otitis media), and occurs more often at or past middle life, and in rheumatic subjects. The condition is aggravated by any catarrh of the nose and throat, which should be carefully treated if present. Should the inflammation attack the mastoid process it may spread to the brain. As it may attack the brain indirectly, with fatal consequences, its prevention and cure are of real importance. Children with enlarged tonsils and adenoids should have them treated early. Great care should be taken to keep the nose and throat clean during an attack of scarlet fever or measles. Inflammation of the mastoid, indicated by pain, tenderness, and sometimes swelling behind the ear, demands urgent operative treatment. The introduction of penicillin and the sulpha group has altered the treatment. See *Ear*.

Otley. Market town and urban dist. of the W. Riding of Yorkshire, England. It stands on the Wharfe



Otranto, Italy. Ruins of the castle built, about 1450, by Alphonso of Aragon

10 m. N.W. of Leeds by rly., and has good bus services to Leeds and Bradford. The chief building is the restored Perpendicular church of All Saints, containing monuments to the Fairfax family, whose seat, Denton Park, is in the neighbourhood. There is a grammar school founded in the 17th century. The town has an agricultural trade and manufactures machinery and leather goods. In the vicinity are stone quarries, and overlooking the town to the immediate S. is the Chevin Hill, 925 ft. At one time Otley sent two members to parliament; now it joins with Pudsey to elect one. Market day, Fri. Pop. 11,020.



Otley arms

Otoliths. Ear stones, or chalky concretions in the inner ear of many animals. They occur in vertebrates in the fluid of the internal ear, and their function is that of an organ of balance. They are best seen in the fishes, where they are often large and porcelaneous, as in the cod tribe. They occur in many vertebrates and some molluscs.

Otomi. Group of American Indian tribes in the Mexican states of Guanajuato, Hidalgo, and Mexico (nomads). They number perhaps 200,000, not counting the allied Mazahua, and Chichimeo. Small, dark, roundish-headed, they represent the primitive inhabitants of the Anahuac plateau, who were driven into the uplands by the Nahuas (Aztec) invaders, and still preserve their pre-Toltec culture.

Otranto. City of Italy, in the prov. of Lecce, Apulia. It is on the S.E. coast on the strait of the same name, 45 m. S.E. of Brindisi, with which it is connected by rly. It was destroyed by the Turks in 1490. The cathedral contains a remarkable mosaic pavement of 1166; the church of San Pietro has Byzantine frescoes. The castle, built by Alphonso of Aragon and strengthened by Charles V, gives its name to a romance by Horace Walpole, published in 1764. In the Second Great War the city, with the rest of the Otranto pen., was occupied by Allied troops without opposition by Sept. 12, 1943.

Otranto, STRAIT OF. Outlet of the Adriatic Sea between S. Italy and Albania. It is 40 m. wide; a cable connects the ports of Otranto and Valona. During the First Great War, British drifters guarded the mines and anti-submarine nets laid there. Two attacks were made on the drifters, July 9, 1916, and May 15, 1917; many were lost.

Otsu. City of Japan, in Honshu. Situated on the S. shore of Lake Biwa, 10 m. by rly. E.S.E. of Kyoto, it is a centre for the local hemp industry. Pop. 58,000.

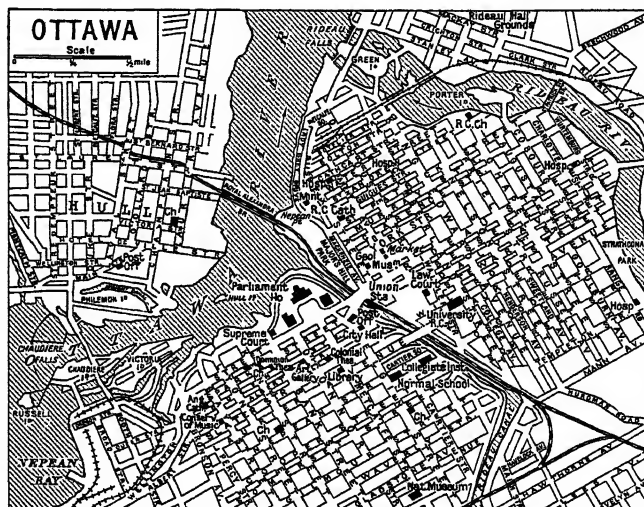
Ottakar or **OTTOKAR.** Name of two kings of Bohemia. Ottakar I, who belonged to the family of the Premyslides, seized Bohemia 1192-96, but had to fight hard for recognition. He took part in the contest for the German throne between Otto IV and Philip of Swabia. By 1222 he had gained Moravia. Dying in 1230, he was succeeded by his son Wenceslaus.

Ottakar II, a grandson of Ottakar I, began to reign in 1253. He had already made himself duke of Austria, and led a faction against his father. By force of arms he added to Bohemia the duchies of Styria and Carinthia, and in 1273 had a good chance of being chosen German king. Rudolf of Hapsburg, however, was preferred, and war broke out. Ottakar was beaten and compelled to surrender all his lands save Bohemia and Moravia. Trying to recover them, he was killed in battle, Aug. 26, 1278.

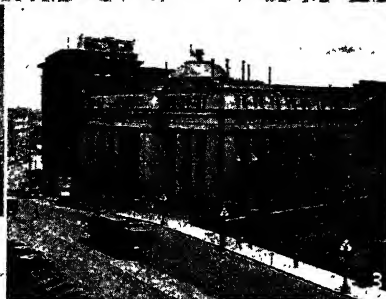
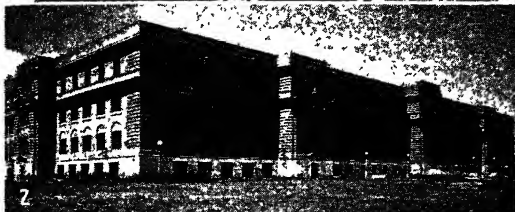
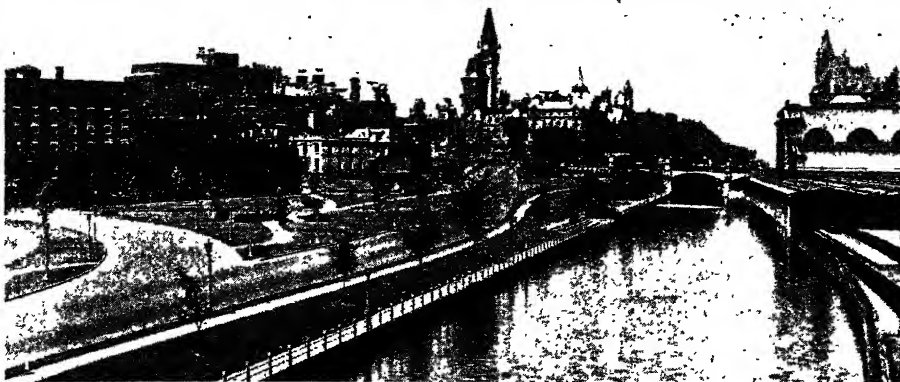
Ottawa Rima. The standard measure of Italian heroic verse. It is a stanza of eight iambic pentameter lines, the first six of which rhyme alternately, while the last two are a couplet with a third rhyme. Byron's Don Juan is the classic English example.

Ottawa. River of Canada, tributary of the St. Lawrence. It rises in the lakes in the W. of the prov. of Quebec, and flows W. to Lake Temiscaming. Turning E., it forms the boundary between Ontario and Quebec, passes the cities of Ottawa and Hull, and joins the St. Lawrence by two branches at Montreal. Its length is 780 m. It is partly navigable, and has been made more so by the construction of short canals. Its several falls, notably the Chaudière and Rideau, supply water power for electricity. The Rideau Canal connects it with Lake Ontario. Its chief tributaries are the Gatineau, Lièvre, Coulonge, Madawaska, and Rideau; most of them are lumbering streams.

Ottawa. City and capital of Canada. It is in Carleton county, Ontario, at the point where



Ottawa, Canada. Plan of the capital city of the Dominion



1. Rideau canal as it approaches Parliament House, conspicuous by its clock tower, seen centre. 2. The national research building. 3. Union rly. station. 4. Confederation Square, dominated by the national war memorial, commemorating Canadian fallen of the First

Great War. On left is the Château Laurier, the city's foremost hotel. 5. The Supreme Court, the cornerstone of which was laid by H.M. Queen Elizabeth in 1939 6. The prime minister's residence, Laurier House 7. Rideau Street, a principal shopping centre

OTTAWA: THE CAPITAL CITY OF THE DOMINION OF CANADA

Photos Nos 1, 4, 5, 6, 7, Canadian National Film Board, Nos. 2 and 3, Fox photos

the Rideau joins the Ottawa, 116 m. W. of Montreal, and is served by C.N.R., C.P.R., and the New York Central rly. Electric lines run through the city and connect it with its suburbs and with Hull on the other side of the Ottawa.

The fine parliament house was burned down in 1916, but was rebuilt. The prominent feature of the new building is its great Tower of Peace, in which is a memorial chamber, commemorating Canada's 60,000 soldiers who gave their lives during the First



Ottawa arms

Great War. In 1921 a replica of the chair in the British house of commons was formally presented by Lord Ullswater, ex-Speaker. The national museum, art gallery, observatory, and Rideau Hall, the official residence of the governor-general, are notable buildings. There are R.C. and Anglican cathedrals, many churches and schools, a university (*v.i.*), and fine parks.

Largely a residential city, Ottawa is also a centre of the lumber industry, and there are manufactures of machinery, flour, paper, etc. The falls near the city provide plentiful water power. The town was founded about 1829 as a residence for British engineers who were working in the neighbourhood, and was called Bytown. In 1854 its name was changed to Ottawa, an Indian name, and its importance began when it was selected as capital on the inauguration of the dominion in 1867. Pop. 163,690.

Ottawa, UNIVERSITY OF. Canadian educational institution at Ottawa. An R.C. establishment, it is conducted by the Oblate Fathers of Mary Immaculate. It was incorporated in 1849 as the college of Bytown, the old name of Ottawa. In 1861 it became the college of Ottawa, and in 1866 a university. Its chief departments are arts, philosophy, and theology, and it is equipped with museums, laboratories, and a library.

Ottawa Agreements. Imperial preference agreements concluded at the Ottawa conference of 1932, and ratified by Great Britain in the Ottawa Agreements Act. The mother country undertook to admit dominion and Indian imports duty-free; maintain the 10 p.c. duty on timber, canned and fresh fish, canned meat, leather, lead, zinc, etc., from foreign sources;

and impose new or increased duties on commodities such as dairy produce, fruit, meat, wheat, and tobacco, in which one or other dominion was specially interested. Dominion and Indian governments imposed protective duties on manufactured products, especially iron and steel, from places outside the Empire. A clause was inserted, avowedly aimed at the U.S.S.R. "dumping" programme, providing that if the preferences were being frustrated by "state action" of any foreign country, steps would be taken to ban the import from that country of the goods concerned. The Anglo-Russian trade agreement was accordingly denounced. The Ottawa agreements were vigorously criticised by free traders as a retrograde step, and led to the resignation from the British govt. of Liberals under Sir Herbert Samuel and of Viscount Snowden. *See* Imperial Preference.

Ottelia. Small genus of aquatic perennial herbs of the family Hydrocharitaceae. They are



Ottelia. Flowers and heart-shaped leaves of the aquatic herb

natives of tropical and subtropical regions. They have submerged and floating leaves (the latter heart-shaped) and six-partite flowers. *O. indica* is used as a potherb in India.

Otter (*Lutra*). Aquatic carnivorous fur-bearing mammal, belonging to the family Mustelidae. Widely distributed, being found in Europe, Asia, and America, it is usually about 2 ft. long in body with a tail 18 ins. long, and is cat-like in general form. It has thick brown fur, of considerable commercial value, especially in the American species. The feet are webbed, and the long flattened tail assists in swimming. Otters are not uncommon in secluded waters of Great Britain; but the havoc they work among the fish, of which they kill more than they need, causes them to be remorse-



Otter. Common British species of the aquatic mammal
W. S. Berridge, F.Z.S.

lessly persecuted. They live in burrows in the river banks, but frequently descend to the sea, where they feed upon molluscs, crustaceans, and fish.

Otter hunting, which was an organized sport in the time of Henry II, takes place from May to Oct., the only form of hunting carried on during summer in the U.K. It is conducted on foot with otter-hounds (*q.v.*), of which there are many packs in England and Wales, and a few in Scotland.

Otterburn. Village of Northumberland, England. It is 31 m. N.W. of Newcastle-upon-Tyne, on the Rede, in Redesdale. There is a modern church, S. John the Baptist. Otterburn Tower occupies the site of an ancient one. Pop. 361. The village is famous for the battle fought between the Scots and English, Aug. 19, 1388. The invading Scots, under James, earl of Douglas, were retreating N. from Durham and encamped on a hill near Otterburn. They were attacked in moonlight by Sir Henry Percy (Hotspur) and his brother Ralph, both of whom were taken prisoner. Douglas was slain, but the Scots proved victorious. The ballad of Chevy Chase (*q.v.*) describes an otherwise unknown fight, often confused with this.

Otter Hound. Breed of dog descended from the old Southern hound of Great Britain. The true otter hound much resembles the



Otter Hound. Champion type of the breed of dog used in otter hunting

harrier in general appearance, but has large broad feet and a rough thick coat of rather greasy hair. Many so-called otter hounds are modified foxhounds. The otter hound possesses good scent and keen sight. It is a powerful swimmer and has great endurance, faces its quarry gamely, and is of a savage disposition. Its colour varies greatly, and its height should be 22 or 23 ins. See Dog colour plate.

Ottery St. Mary. Urban dist. and market town of Devon, England. It stands on the Otter, 12 m.



Ottery St. Mary, Devon. Parish church of S. Mary, with the tower of the south transept on the left
Frith

E. of Exeter, with a rly. station. It is noted for its beautiful church, S. Mary's, with two transeptal towers and other features of interest; one of the most magnificent churches in the country, it dates from the 13th and 14th centuries. Ottery was the birthplace of Coleridge. The grammar school at which he was educated was pulled down in 1884. Ottery figures in Pendennis as Clavering St. Mary. Market day, alternate Tues. Pop. 4,000.

Otto I, THE GREAT (912-973). German king and Roman emperor. He was born Nov. 23, 912, son of Henry the Fowler, whom he succeeded in 936. At first virtually little more than duke of Saxony, he ended by restoring the empire of Charlemagne.

Even in Saxony Otto was confronted by opposition, developed by his brother Henry and his half-brother Thankmar into a formidable conspiracy, in which the dukes of Lorraine and Franconia were also concerned. Having crushed this at Andernach, Otto proceeded to get the great duchies, as far as possible, into the hands of his relatives, with even worse results. His son Ludolf in Bavaria and his son-in-law Conrad in Lorraine organized another great conspiracy, in the course of which

Otto himself was taken prisoner in 952; but by making promises which he at once broke, he gained freedom and finally crushed the rebels at Regensburg. Otto conducted a short and successful war against the king of France about the possession of Lorraine, secured his people from external foes, and made a landmark in medieval history by his great victory over the Magyars on the Lechfeld in 955. Before his death the rulers of Bohemia, Poland, and Denmark all did homage to him.

In 951 Otto went to Italy, and Berengar, sometimes called king of Italy, did homage to him; but his position there was dubious until a second visit, when he was then crowned emperor in Rome by the pope, Feb., 962. He did much for the organization of the Church, giving responsible posts to ecclesiastics. He was twice married, his

first wife being Edith (d. 946), daughter of the English king, Edward the Elder, and his second the widow of Lothair of Italy. Otto died May 7, 973.

Otto II (955-983). German king and Roman emperor. Son of Otto the Great by his second wife Adelaide, he was crowned king when only six, and joint emperor in Rome in 967. In 973, on his father's death, Otto became ruler of Germany and Italy, but his ten years' reign was spent in warfare, by which he lost Lorraine to the French. Otto, who died in Rome, Dec. 7, 983, married Theophano, daughter of the East Roman emperor Romanus II.

Otto III (980-1002). German king and Roman emperor. He succeeded his father Otto II at the age of three, and was trained by his Greek mother Theophano to despise the Germans. Crowned by Pope Gregory V, his cousin, in Rome, May 21, 996, Otto endeavoured to revive the ancient conception of the Roman empire. He checked German ascendancy by strengthening the Poles and Hungarians, suppressed the revolt of the Roman Crescentius, whom he put to death 998, and made his tutor Gerbert pope as Sylvester II, 999. He was driven from Rome by the Italians. Died Jan. 23, 1002.

Otto IV (1174-1218). German king and Roman emperor. The second son of Henry the Lion, duke of Bavaria and Saxony, and of Matilda of England, after the death of the emperor Henry VI he was elected German king at Cologne, June 9, 1198, by the Guelph party, in opposition to Philip of Swabia. On Philip's murder in 1208 Otto was elected emperor, and crowned in Rome, Oct. 4, 1209, but in the next year was placed under the ban for seizing papal territory, and was deposed by the Hohenstaufen party, who set up Frederick II. Otto was beaten at Bouvines by the French, 1214. He died May 19, 1218.

Otto I (1848-1916). King of Bavaria. Born April 27, 1848, second son of Maximilian II, he became king on the death of his elder brother Louis II on June 13, 1886. He had, however, been insane for ten years, and his uncle, Prince Luitpold, acted as regent until his death in 1912, when it was decided to depose the king as incurably insane, in favour of his cousin Louis III. Otto died Oct. 3, 1916.

Otto I (1815-67). King of Greece. Born June 1, 1815, the second son of Louis I, king of Bavaria, he was



Otto I,
King of Greece

invited, in accordance with the London protocol of May 7, 1832, to accept the throne of liberated Greece, Feb. 6, 1833. In 1836 he dismissed the unpopular Bavarian Armansperg, who had been chief of the council of regency during his minority. The revolution of Sept., 1843, compelled the king to call a national assembly charged to draw up a constitution, but this step failed to secure a stable government. His difficulties were increased by a brief rupture of relations with Turkey in 1847. Military plots against the monarchy in 1861-62, failed, but on Oct. 21, 1862, an insurrection led to the abdication of Otto, who retired to Bavaria. He died at Bamberg, July 26, 1867.

Otto (b. 1912). Austrian prince and pretender to the throne of Austria-Hungary. Francis Joseph Otto of the house of Hapsburg-Lorraine became crown prince when his father Charles succeeded to the throne in 1916. When Charles abdicated after the First Great War, Otto accompanied him into Switzerland, and later, after

his father's two unsuccessful attempts to regain the throne, went to Madeira. After Charles died, April 1, 1922, Otto moved to Spain, and later to Belgium. In the Second Great War he went to the U.S.A., but returned to Europe in 1944. Monarchists both in Austria and in Hungary looked on him as their rightful king.

Otto, NICHOLAS (1832-1891). A German engineer. Born at Deutz, June 10, 1832, he studied engineering and devoted his energy to developing the internal combustion engine. In 1794 Robert Street, an associate of James Watt, had made a primitive type of gas engine which Otto used as the basis of his own experiments. In 1876 he produced the first engine working on the four-stroke cycle, the fuel used being coal gas. It was first publicly exhibited at the Paris exhibition in 1878. It is generally agreed that Otto's was the first practical engine, and from it have been developed the power units which made possible the motor vehicle and the aeroplane. Otto died Jan. 26, 1891. See Internal Combustion Engine.

Ottoman. Kind of couch or divan without back or arms. Of Turkish origin, it became fashionable in England about 1800. One form was a long box with a cushioned lid, another form had a head and foot rest.

Ottoman. Name of the dominant Turkish people. It is derived from Osman, who about 1290 became the leader of a tribe living under the protection of the Seljuks. Having won a great reputation as a fighter, he declared himself independent, and is regarded as the founder of the Turkish or Ottoman Empire, for his tribe, known as the Ottoman Turks, entered on their career of conquest, and in 1453 planted themselves at Constantinople (Istanbul). See Turkey.

Otto of Roses, OR ATTAR OF ROSES (Arab. *yir*, perfume). Essential oil extracted from rose petals by distillation with steam. The oil separates in the receiver. Perfume of roses has always been highly appreciated; there are many references to it in ancient literature and mythology. In early times it appears to have been used mainly in unguents prepared by an extraction of petals with oils or fats; sesame oil was specially valued for this purpose. Rosewater, obtained by distilling the petals with water, was perhaps originally produced in Persia. The value of the essential oil which

rose to the surface does not appear to have been realized until 1600.

Production of otto was established in Bulgaria in 1710 with flowers (*Rosa damascena*) from Asia Minor. By 1750 Bulgaria had become the chief source of supply, and it has maintained its position, though cultivation has extended to France. During 1927-37 Bulgarian annual production was some 10,000,000 kilos of flowers, yielding about 200 kilos of otto, France being the largest buyer. The main rose growing area extends about 100 m. along the southern slopes of the Balkans. The French industry is mainly around Grasse, where the chief species cultivated is *R. centifolia*. In France rosewater is the chief product, whereas in Bulgaria the otto is more important.

The composition of otto of roses is complex, the principal constituent being *l. citronellol*, 45-55 p.c. The odour is subtle and varies according to the flowers used and the methods of extraction. Chemical analysis gives no satisfactory indication of quality; olfactory examination alone supplies the information required by the perfume maker. *Consult* Perfumes, Cosmetics, and Soaps, W. A. Poucher, 1941.

Ottumwa. City of Iowa, U.S.A., the co. seat of Wapello co. It stands on both banks of the Des Moines river, 76 m. by rly. W.N.W. of Burlington, and is served by the Chicago, Milwaukee and St. Paul and other rlys. Industries include the manufacture of iron and steel, agricultural implements, wagons, flour, paper, cigars, bricks, and tiles. It has several meat packing houses, and carries on a large trade

in agricultural produce and coal. Ottumwa was settled in 1843, as the result of a peace treaty with Indians under Chief Ottumwa, who is buried outside the town. It became a city in 1857. Population 31,570.

Otway, THOMAS (1651-85). English dramatist. He was born at Trotton, Sussex, March 3, 1651, and educated at Winchester and Christ Church, Oxford. In 1675 appeared his first play, the tragedy of *Alcibiades*, which had some success chiefly owing to the fine acting of Mrs. Barry, with whom Otway fell in love. Her



Thomas Otway, English dramatist

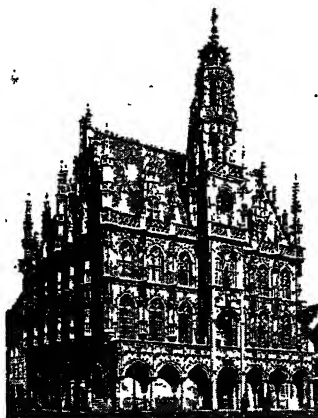
cruel treatment of him drove him first into the army and a campaign in Flanders with a cornet's commission, and latterly to a life of degrading dissipation. He died in utter destitution, April 14, 1685. Otway's best-known play is the great tragedy, *Venice Preserved*, 1682, in which he shows himself a master of pathos and passion. Another fine tragedy is *The Orphan*, 1680. He also wrote several comedies, of which the most interesting is *The Soldier's Fortune*, 1679. *Consult* Works and Life, ed. T. Thornton, 1813.

Oubain or G-STROPHANTHIN. Crystalline glycoside obtained from the seeds of *Strophanthus gratus*, a plant which grows in Sierra Leone and the Cameroons. The name oubain was first given to a substance isolated from the wood of *Acocanthera oabain*. It is more poisonous than strophanthin (*q.v.*).

Oubiette (Fr. *oublier*, to forget). Medieval term for a pit or well constructed in the masonry of a castle dungeon, and used for the close confinement of prisoners. Oubiettes were also used for the secret disposal of prisoners' bodies. See Castle.

Oudenarde OR AUDENARDE. Town of Belgium. In the prov. of E. Flanders, it is 10 m. S. by W. of Ghent, and is built on both sides of the Schelde. Its chief building is the town hall, a beautiful 16th century edifice with a tower in five storeys, reputed the finest hôtel de ville in Belgium after that of Brussels. The chief churches are S. Walburga's and Notre Dame. Pop. approx. 7,000.

Oudenarde, BATTLE OF. Fought July 11, 1708, between the British and their allies and the French.



Oudenarde, Belgium. The 16th century town hall, on the N. side of the Grande Place

The former had a small garrison in Oudenarde, which was being attacked by a French army under Vendôme. This occupied a position behind the Norken, a tributary of the Schelde. Marlborough decided to fight at once. He sent an advance body across the Schelde, and the opening encounters took place just across that river while the rest of the allied force was crossing it.

The allied crossing had not been completed when the duke of Burgundy, who shared the command with Vendôme, ordered his army forward, and in the angle formed by the Schelde and the Norken the main engagement was fought out, chiefly by the infantry. A French attempt to disorganize the allies before they were in order of battle failed, and the French found themselves half encircled. A turning movement made by some Dutch troops against the French right completed their discomfiture. The left wing withdrew in good order and covered the withdrawal of the rest, and a rout was averted by the oncoming of night. The allied army—British, Hanoverian, Prussian, and Dutch—was perhaps 30,000 strong, and lost about 3,000 killed and wounded. The French, who numbered perhaps 40,000, lost 15,000, including prisoners. *See* Spanish Succession, War of the.

Oude Rijn. River of the Netherlands, one of the branches of the lower Rhine. At Utrecht the Kromme Rijn divides into the Vecht and the Oude Rijn (Old Rhine), the latter flowing W. through the provs. of Utrecht and S. Holland to reach the North Sea at Noordwijk. *See* Leyden; Rhine.

Oudh. E. portion of the United Provinces of Agra and Oudh (now called Uttar union), India. It lies between Nepal and Vindhya union and between Agra and Bihar. Lucknow is the capital. In ancient days a flourishing kingdom, later successively under the sway of the Afghan and Mogul emperors, it became independent about 1732. In 1856 Dalhousie deposed the king of Oudh, and his territory was incorporated in what were then called the North-Western provinces. Its area is 24,071 sq. m. Pop. 14,114,470. *See* United Provinces.

Oudinot, CHARLES NICHOLAS (1767–1847). French soldier. Born at Bar-le-Duc, April 25, 1767, he entered the army in 1784, but soon retired. On the outbreak of the Revolution he rejoined, becoming a general in 1794. As chief of staff to Masséna, he added greatly to his

reputation, was made inspector-general of infantry, and sat in the chamber of deputies. In 1805, in command of his division, the grenadiers, Oudinot had a large share in the victory of Austerlitz; he was also at Friedland, and for his conduct at Wagram Napoleon made him a marshal. Having been governor of Holland, 1810–12, he was in the Russian campaign and at Leipzig, but in 1814 he went over to the Bourbons, to whom he remained faithful during the Hundred Days. In 1823 Oudinot led an expedition into Spain. He died Sept. 13, 1847. Napoleon made him duke of Reggio, and other honours were given to him by Louis XVIII. His son Charles, duke of Reggio (1791–



Marshal Oudinot, French soldier

1863), in 1849 was in charge of the French army that took Rome and restored the temporal power of the pope.

Oudtshoorn. Town of the Cape Province, S. Africa. It stands on the Grobelaars river, a tributary of the Olifants, 277 m. by rly. W. of Port Elizabeth. The chief buildings are several churches, chamber of commerce, public library, drill hall, hospital, and theatre. Oudtshoorn is the centre of a prosperous agricultural district in which fruit, vegetables, cereals, and tobacco are grown and ostriches and pigs are reared. In the Second Great War there was a school of the Empire air training scheme. To the N., 18 m. away, are the Congo Caves, perhaps the finest stalactite caverns in the world. Pop. approx. 17,000.

Oughter. Lough or lake of Eire. In the N. of Cavan, Ulster, it contains a number of small islands. It is fed and drained by the river Erne, and measures 4 m. in length and 3 m. in breadth.

Ougrée. Town of Belgium, in the prov. of Liège. It lies on the right bank of the Meuse, 2½ m. S.W. of Liège. It has busy metal and coal industries, and is a centre of the Liège-Seraing industrial area.

Ouida. Pen-name of Marie Louise de la Ramée (1839–1908). British novelist. Born Jan. 1, 1839, at Bury St. Edmunds, she was the daughter of Louis Ramé, a teacher of French. She began to write at about 20 under the influence of Harrison Ainsworth, and produced some 40 flamboyant



Ouida

novels, including *Strathmore*, 1865; *Under Two Flags*, 1867; *Moths*, 1880; *The Massarenes*, 1897; also short stories and essays of merit.

At one time she enjoyed great popularity, but her vogue diminished, and she died in poverty at Viareggio in Italy, Jan. 25, 1908. Ouida had intellectual gifts and the faculty of telling an interesting story. She was passionately devoted to animals. *Pron.* Wee-da.

Ouija (Fr. *oui*, yes; Ger. *ja*, yes). Apparatus used in occult experiments. It is a board on which the alphabet and various conventional signs are written, and is used for receiving automatic messages. *See* Planchette; Spiritualism.

Oulton. Village of Suffolk, England. It lies 2 m. W. (inland) from Lowestoft and has a rly. station. S. Michael's church shows remains of Norman work. Borrow lived for many years in the village, which has a pop. of 4,644. Oulton Broad is a stretch of water visited for yachting and angling. The full name of the mun. bor. is Lowestoft and Oulton Broad. Lake Lothing extends between Oulton village and the North Sea.

Oulu. District of Finland. It is in the N. and has an area of 21,887 sq. m. It is bounded W. by the gulf of Bothnia, which separates it from Sweden; E. by Russia; and N. by Norway. Pop. 327,422. The capital town, also called Oulu, has a pop. of 32,270.

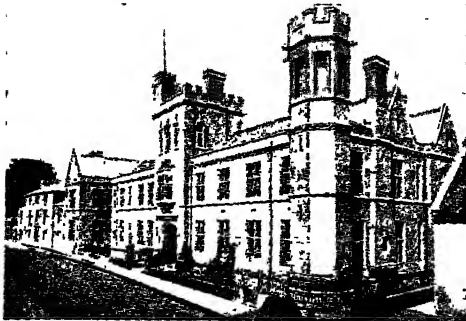
Ounce. Measure of weight. In Great Britain it is the 12th part of a pound troy, and the 16th part of a pound avoirdupois. A fluid ounce is a measure of capacity, and equals one avoirdupois ounce of distilled water at 62° F. The ounce troy contains 480 grains, and the ounce avoirdupois 437½ grains.

Ounce or SNOW LEOPARD (*Felis uncia*). Species of leopard. Found in the mountainous districts of Central Asia, it reaches a length of 7 ft. and differs from the true leopard in its long woolly fur, whitish-grey colour, large spots, and arched skull. It never descends to the plains, and preys upon wild sheep and goats. *See* Leopard.

Oundle. Urban dist. and market town of Northamptonshire, England. On the Nene, 30 m. from Northampton and 13 m. from

Peterborough, it has a rly. station. The chief building is the church of S. Peter, a fine old edifice with a lofty spire and some interesting architectural features. The Talbot Inn was built partly from materials brought from Fotheringhay. Brewing is an industry. There is an agricultural trade. Oundle was a market town before the Norman Conquest, and a place of some importance through the Middle Ages, though it never secured incorporation. Market day, Thurs. Pop. 3,100.

Oundle School. English, public school. It was founded under the will of Sir W. Laxton, lord mayor of London, who, dying in 1556, left some property in the city of London to the Grocers' Company for the purpose. It was a country grammar school until the 19th century, when, the estates having greatly increased in value, the Grocers' Company began to enlarge it, and many new buildings were erected from 1883 onwards, and in 1930 it was incorporated by royal charter. Its most famous headmaster (1892-1922) was F.



Oundle School, Northamptonshire. Main buildings of the school governed by the Grocers' Company of London

W. Sanderson (*q.v.*). There is now accommodation for 625 boys in 12 houses. The buildings include chapel, great hall, and library, and there are 100 acres of playing fields, as well as a school farm and gardens. The foundation also supports another school, the Laxton School.

Our Dumb Friends' League. British society for the encouragement of kindness to animals. Founded in 1897, it had, fifty years later, 49 local branches, and maintained an animals' hospital in Belgrave Road, London, S.W.1, and a home for lost dogs in North London. A fund started in 1900 provides 2,000 free dog licences to poor persons. Eight shelters for stray animals are maintained in London. A junior branch incul-

cates the principles of kindness to animals in the young. The head offices are at Grosvenor Gardens House, London, S.W.1.

Ourisia. Small genus of perennial herbs of the family Scrophulariaceae. Natives of S. America and New Zealand, they have large, notched leaves, springing from the rootstock, and long tubular flowers with acutely lobed mouths.

Our Mutual Friend. Charles Dickens's thirteenth and last completed novel. It was published in monthly parts (May, 1864-Nov., 1865), with illustrations by Marcus Stone. In its remarkable range of scenes and characters it presents a rich picture of, and implicit commentary upon, English life of the period. It is especially memorable for its London riverside scenes and those of parvenu society. The characters include two of Dickens's most appealing heroines, Bella Wilfer and Lizzie Hexham; the pompous Podsnap; the newly-rich Veneerings; Mr. Boffin, the "golden dustman"; the fortune-hunting Lammles; and a powerful study of repressed passion in the schoolmaster, Bradley Headstone.

Ouro Preto. Town of Brazil, in Minas Geraes. It occupies the slopes of a mountain, and wheeled traffic is impossible in its streets. It was founded in 1699 and called Villa Rica from gold mines, which are still worked, as are deposits of

iron and manganese. There are shoe factories and textile mills. It was the capital of the state until superseded in 1897 by Bello Horizonte. It contains a school of mines, and the oldest theatre in Brazil, and has rly. connexion with Rio de Janeiro. Pop. 60,000.

Ourthe. River of Belgium. Rising E. of Gouvy, it flows through the prov. of Luxembourg, first W. then N., and joins the Meuse near Liège, which was the capital of a French dept. called Ourthe under Napoleon I. The Aisne, Amblève, and Vesdre are tributaries. Its total length is 103 m., and it is navigable for a distance of about 36 m.

Ouse. Name of several English rivers. It is a Celtic word meaning water, the same root being in Esk.



Ourisia. Foliage and flower spike of the perennial herb

Ouse. River of Sussex, England. It rises in the county between Horsham and Cuckfield, and flows mainly S. past Lewes, where it cuts through the S. Downs to the English Channel at Newhaven. Its length is 30 m., of which about 25 are navigable for small vessels.

Ouse. River of Yorkshire, England. It is formed by the Ure and the Swale, which unite near Boroughbridge. Thence, as the Ouse, it flows past York, Selby, and Goole to the Trent, with which it unites at Faxfleet, below Goole, to form the Humber. The length is 60 m., and it is navigable to York, 45 m. from its mouth. Its chief tributaries are the Nidd, Wharfe, Aire, Don, and Derwent. See Humber.

Ouse, GREAT. River of England. It rises near Brackley in the S.W. of Northamptonshire and flows, mainly E., through Buckinghamshire, Bedfordshire, Huntingdonshire, Cambridgeshire, and Norfolk to the Wash, 2½ m. below King's Lynn. Its chief tributaries are the Ivel, Cam, Lark, Ouzel, and Little Ouse, and its length is 158 m. It is navigable to Bedford; other places on its banks include Stony Stratford, Huntingdon, and King's Lynn. Two artificial channels, called the old and the new Bedford rivers, cut off a large bend of the Ouse between the E. border of Huntingdon and Downham Market. The last 3 m. of its course is another artificial channel. It is tidal for 16 m. The extensive drainage system is controlled by a board with headquarters at Cambridge. As a result of disastrous flooding in March, 1947, the Great

Ouse Catchment Board considerably extended this work.

Outboard Motor. Power unit attached to the stern of a small boat. It is generally of the two-stroke type, and is a completely self-contained unit incorporating propeller, rudder, and fuel tank. It is generally of from one to three h.p. See Motor Boat.

Outer Mongolia. This independent republic of Asia is described under Mongolia.

Outlawry. Exclusion from the protection of the law. It used to take place when anyone wilfully avoided the execution of process in the king's courts. He was civilly dead, his property was forfeited, and he could acquire no rights. At one time, he could be killed at sight; but the right of slaying outlaws early passed away. Outlawry was abolished in civil proceedings in 1879 and in criminal proceedings in 1938.

Outline of History, THE. Book by H. G. Wells, prepared originally with editorial assistance from Ernest Barker, Sir H. H. Johnston, Sir E. Ray Lankester, and Gilbert Murray, and first issued in fortnightly parts, 1919-20. Expressly intended as a corrective to the academic method of teaching history, it emphasised the sweeping perspectives of the story of mankind in a fresh and stimulating way, though both the general view and many of the detailed judgements, expressed and implicit, are strongly coloured by the author's prejudice. The book had an immense sale, and as a result of its success "outlines" of every kind became a popular form of British and American publication throughout the inter-war years.

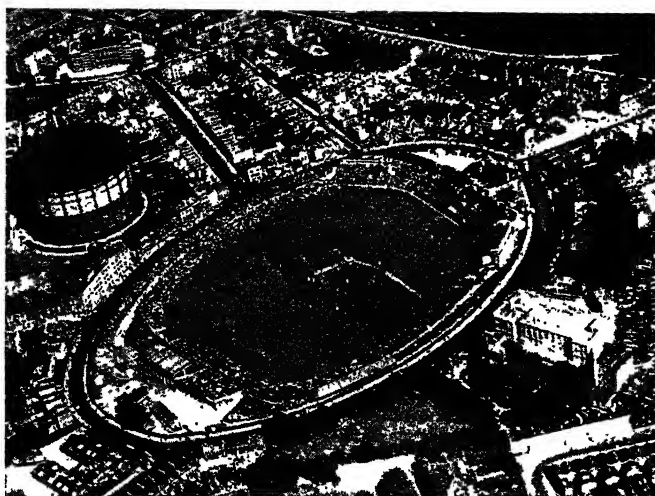
Outram, Sir James (1803-63). British soldier and administrator. Born at Butterley Hall, Derbyshire, Jan. 29,

1803, he joined the East India Company in 1819. He took part in the British campaign in Afghanistan, 1839, was at the capture of Ghazni, and rode in disguise



After T. Briggsstock

from Kalat to Karachi, over 350 m. In 1843 he defended Hyderabad against a strong force of Baluchis. He was appointed chief commissioner of Oudh, and in 1857 commanded the Persian expedi-



Oval, Kennington. Air view of the Surrey County Cricket Club ground, scene of many test matches

tion. In the Indian Mutiny he joined Havelock on Sept. 15, helped to relieve the residency at Lucknow, and held it until relieved by Sir Colin Campbell. He was made lieutenant-general and a baronet in 1858, and is known as the Bayard of India. Outram died March 11, 1863, and was buried in Westminster Abbey. See Indian Mutiny; consult Lives, F. J. Goldsmid, 1880; L. J. Trotter, 1903.

Outrigger. Light boat, sometimes used for racing. Its rowlocks are supported by brackets, rigged out, or projecting from the sides. See Boat; Canoe.

Ouzel. Name for several birds of the thrush family (Turdidae). They are represented in Great Britain by the ring-ouzel (*Turdus torquatus*). This is a large moorland blackbird, with a white crescent across its breast. It is a migrant, reaching England from Africa in April, and leaving again in autumn. Its nest, eggs, and habits are much like those of the common blackbird. The water-ouzel or dipper, a member of the family, is more like a wren, having a short tail. See Dipper.

Ovaherero. Collective name of the Herero people of the coastal plains of S.W. Africa. They speak a Bantu dialect. Formerly they were called Cattle Damaras. Their name is sometimes improperly extended to the Hill Damaras, who have Hottentot characteristics and speech. See Hereros.

Oval, THE. Ground of the Surrey county cricket club. It is on the W. side of Kennington Park Road, London, S.E., has a tube station on the Northern Line,

and covers about 9 acres of the site of the park of Sir Noel Caron, a Dutch ambassador to England in the 17th century. Opened as a cricket ground, April 16, 1846, it is held on a lease from the duchy of Cornwall. The final test match of any rubber between England and a touring team is played at the Oval, which has given its name to test match grounds in Australia. It was at one time the centre of the old Surrey cycle race meetings. See Kennington.

Ovambo OR OVAMPO. Negroid people of S.W. Africa. Numbering some 60,000, in the fertile Ovamboland steppes N.E. of the Hereros, they are distinguished from their allied people by scantier dress, more peaceable disposition, and agricultural pursuits. Their tribes occupy scattered groups of palisaded homesteads, with granaries and chicken-houses on pile supports. Their two Bantu dialects, Ndonga and Kwanyama, are spoken also in S. Angola.

Ovamboland OR AMBOLAND. Country of South-West Africa. Inhabited by the Ovambos, it is situated on both sides of the boundary, between Angola and the South-West Africa Protectorate, mainly in the latter. The native pop. is estimated at 150,000, and the area is about 16,000 sq. m. The country is arid, with no running streams except the Cunene in the extreme N. Many natives own cattle. Before the British occupation in 1915 the only Europeans in the country were Finnish and Rhenish workers with the missionary societies, the Germans in 1906 closing the country to

travellers and settlers. See South-West Africa.

Ovar. A town of Portugal, in Beira prov. It stands near the N. end of the lagoon of Aveiro, 21 m. by rly. S. of Oporto, and 15 m. N. of Aveiro. It has fisheries, and trades in timber, onions, wine, cereals, and vegetables. Pop. 12,700.

Ovary. Gland in the female. It produces the microscopic ova or cells, which, after fertilisation by the spermatozoon, develop into new individuals. Its substance also secretes at puberty those chemicals which give rise to secondary female characteristics, physical and psychic. The ovaries are two in number, and are situated in the pelvis, one on each side of the uterus. Each gland is oval in shape, and in the human being about $1\frac{1}{2}$ ins. in length.

The ovary consists of fibrous tissue crowded with rounded cells and vesicles called Graafian follicles. A follicle enlarges and ultimately bursts, thus releasing a ripe ovum. This process is known as ovulation, and occurs about every four weeks in the adult. The ovum, after being set free, enters the Fallopian tube, where fertilisation, if it occurs, takes place. If the ovum is not fertilised, the lining of the uterus prepared for its reception peels off and passes into the menstrual flow. Removal of the ovaries (ovariotomy) after puberty leads to cessation of menstruation and to atrophy of the uterus and breasts, with loss of interest in the sexual life. Ovaritis or oöphoritis is inflammation of the ovary.

In botany, the ovary is the base of the pistil, containing the carpel or carpels, in which are the ovules or rudimentary seeds. See Flower.

Ovation (Lat. *ovare*, to rejoice). In ancient Rome, a minor celebration of victory accorded to a successful general who was not considered worthy of a full triumph. See Triumph.

Oven. Chamber made of brick, stone, or iron, and heated either from without or within, so that articles can be baked. When it is part of a coal-fired kitchen range the heat is external, the fire being to one side, and the other sides surrounded with flues through which the heat passes. Internal heating is afforded in a gas oven by rows of gas jets; in an electric oven by elements or by electronic means; in a brick oven by a fire burnt until the heat is sufficient, when the ashes are withdrawn, the food inserted, and the door closed. Ovens are used in making

pottery, in metallurgy, and chemical operations. See Furnace; Kiln.

Oven Bird. Popular name for the genus *Furnarius* of S. American birds, resembling tree-creepers, of which there are some 20 species. The name is derived from the oven-like nest constructed by some of the species. In the U.S.A. the golden-crowned water-thrush, *Seiurus aurocapillus*, a kind of wood-warbler, is called oven bird.

Over. At cricket, a group of consecutive deliveries by one bowler from one end of the pitch. In early days there were four balls to the over; from 1889, five; from 1900, six, except that in 1939 the eight-ball over was tried experimentally. In Australian cricket there were six balls to the over from 1887 and eight from 1918. No bowler may deliver two overs in succession in the same innings.

Over. Locality in Cheshire, England, part of the urban dist. of Winsford. It stands on the Weaver, 4 m. W. of Middlewich, with a rly. station, Winsford and Over. It has a salt industry, and sheep and cattle fairs. [S. Chad's is a 16th century church. Pop. 7,336.

Overbeck, JOHANN FRIEDRICH (1789-1869). German artist. He was born at Lübeck, July 4, 1789, and received his early education in art at the academy of Vienna, which he entered in 1806. In 1810, however, he was expelled and went to Rome, where he joined the R.C. Church, although a descendant of a long line of Protestant pastors. He became the leader of a school of painters known as the Nazarenes, who held that the life of the artist, like his work, must be simple. Overbeck lived in an old monastery on the Pincio, and, because of his religious views, refused to work from the living model. He died at Rome, Nov. 12, 1869. Consult Lives, H. Atkinson, 1882; W. Howitt, 1886.

Overbury, SIR THOMAS (1581-1613). English poet and essayist. Born at Compton Scorpion, Warwick, and educated at Oxford and the Middle Temple, his works include the poem *A Wife, Characters or Witty Descriptions of the Properties of Sundry Persons* (his best work), and *Crumbs Fal'n from King James's Table*, which were edited by E. F. Rimbault, 1856. He was an asso-

ciate of Robert Carr (later earl of Somerset), for opposing whose marriage with the countess of Essex he was imprisoned and poisoned, Sept. 15, 1613. See Somerset, Earl of.

Overdraft. Borrowing from a bank, by drawing in excess of the credit balance of a current account within a specified limit. An account having an overdraft limit may fluctuate from being in credit to the highest debit balance permitted, and is thus a favourite method of borrowing by traders and others who can use any funds which they may have in hand for even the shortest time to reduce the interest cost of their borrowing, interest in such cases being calculated on a day-to-day basis.

Overheads. Term used in business and by accountants to denote expenses that pertain rather to the business as a whole than to any single transaction or part of the production, e.g. rent, rates, fire insurance, lighting, heating, postage, stationery. It does not, however, apply to the cost of goods or materials or the wages paid to workmen for manufacturing them into saleable goods. An important problem of cost accounting is to devise methods by which allowance can be made for overhead expenses when estimating the total cost of producing goods or carrying out work.

Overijssel. Alternative spelling of the Dutch prov. entered under Overysse in this work.

Overland Route. Popular term for the quickest way between Great Britain and India. It runs overland through Paris, Lyons, the Mt. Cenis Tunnel, Modena, and Brindisi; thence by steamer to Port Said, and through the Suez Canal and Red Sea to Bombay. The average time taken is 20 days.

Overload. In electrical engineering, the amount of load or work imposed on an electric generator or motor over and above that which it was designed to carry or to perform economically. The effect of an overload on an electric motor is to reduce speed, lessen the counter electromotive force, and, by permitting an undue quantity of current to pass through the windings, to overheat them and possibly destroy their insulation.

Overlord, OPERATION. Code name given to the invasion of the Continent by Anglo-American forces, June 6, 1944. See D-day; Europe, Liberation of.

Overlying. Suffocation of an infant by pressure against the mother or other person while in



Sir T. Overbury,
English poet
After N. Whittock

bed. The infant mortality from this cause has greatly declined in the 20th century. Under the Children and Young Persons Act, 1933, where a child under 3 has died while in bed with some person over 16, it is presumed that that person has been guilty of the offence of neglecting the child if he or she was under the influence of drink when he or she went to bed.

Overreach, SIR GILES. Character in Massinger's play, *A New Way to Pay Old Debts*, 1625-26. An upstart, envious of the caste from which his birth excludes him, he seeks to marry his daughter to a nobleman and so triumph over those whom he has ruined financially, but who still rebuff him. Overreached, he loses his reason. His prototype has been found in Sir Giles Mompesson (1584-1651).

Overseas Food Corporation. See N.V.

Over-Seas League. Organization founded in London by Sir Evelyn Wrench in 1910. In 1948 it had a membership of 58,000. Its aims were to arouse interest in British Commonwealth affairs and problems; to provide places all over the world where British subjects could meet;



Over-Seas
League
badge

and to promote migration within the Commonwealth. World h.q.: Over-Seas House, Park Place, St. James's Street, London, S.W.1.

Overseer. This term was specifically applied to the unpaid officials formerly appointed each year in every parish in England and Wales to make provision for its poor. Their office was instituted in 1601. Appointments were made from a list of householders resident in the parish. Their duties included the making and levying of poor-rates, and the preparation of valuation, voters', and jury lists. In 1927 their powers and duties were transferred to the town councils or other rating authorities.

Oversoul. A term used by R. W. Emerson to express the idea of God as the supreme spirit which animates the universe. He compares the oversoul to the atmosphere which embraces the earth in its bosom; it is the absolute unity, in which each man's particular being is contained and made one with all the others.

Overton, ROBERT (1609-1668). English soldier. Son of an E. Riding landowner, he fought in the civil war on the parliamentary side, was made governor of Hull, later of Edinburgh, and helped in the sub-

juration of Scotland. Later his ambiguous attitude led to a life of almost constant imprisonment, first by Cromwell, then, after the Restoration, as a suspected fifth monarchy man. Milton described his exploits in *Defensio Secundo*.

Overtones. In a vibrating system the lowest frequency of response is termed its fundamental. Integral multiples of this frequency are known as overtones or harmonics.

Overture. Musical composition for instruments, intended originally as an introduction or opening of an opera, suite, oratorio, or play.

Handel modelled his overtures on Lully's, Bach based his concertos on the Scarlatti overture. Later, with the growth of sonata form, the overture developed on similar lines, and many of the opera overtures of Mozart, Beethoven, Weber, and the early Wagner are symphonic or sonata movements, some of them foreshadowing the works which they preceded either by employing the same themes, or merely by inducing an atmosphere. Concert overtures are on similar lines, but independent of any opera or play, such as Mendelssohn's *Fingal's Cave* and Schumann's *Bride of Messina*.

Overysse, or **OVERIJSSSEL**. Province of the Netherlands. With an area of 1,300 sq. m., it adjoins the provs. of Friesland, Drenthe, and Gelderland, its W. frontier being that of Germany, its E. being the Yssel Meer. It consists mostly of flat marshy country, with moors, fens, and woods. Sheep and cattle are reared and dairy produce is important. The Yssel, Vecht, and Regge are the chief rivers. Zwolle is the capital. Pop. 623,504.

Ovid (43 B.C.-A.D. 17). Roman poet, whose full name was Publius Ovidius Naso. He was born on March 20, 43 B.C., at Sulmo (mod. Sulmona), in the country of the Paeslign. As he was intended for the legal profession, his father took him to Rome, where he studied under the most famous rhetoricians of the day. He showed great promise as a lawyer, and held some minor official positions, but he felt that poetry was his profession. At the age of 27 he wrote the tragedy of *Medea*, unfortunately lost, of which Quintilian speaks in the highest terms. With an increasing reputation and enjoying the favour of Augustus, in A.D. 9 he was suddenly "relegated" (see *Exile*) to Tomi, now Constanta, on the Euxine. The reason has never been explained. He himself attributes it to one of

his poems (probably *The Art of Love*) and to an indiscretion. Unable to obtain remission of his sentence, he died at Tomi.

His extant poems, all except the *Metamorphoses* written in hexameters, fall into three classes:

(1) *Erotic*. These include *Heroides*, a collection of fictitious love-letters, written by the heroines of legends to their lovers or husbands; *Amores*, the varied experiences of a lover, written round an entirely imaginary Corinna; *Medicamina Faciei*, *Cosmetics* or the *Art of Making-up*, an account of various toilet devices; *Ars Amatoria*, the *Art of Love*, with instructions for gaining and retaining the affections of a lover or mistress; *Remedia Amoris*, *Remedies for Love*, apparently a kind of recantation of the *Art*.

(2) *Mythological*. These are: *Metamorphoses*, his most famous work, an account of all the myths involving changes of form from the beginning of the world to the transformation of Caesar into a star; *Fasti*, a poetical calendar, giving an account of the heavenly phenomena, the Roman festivals, and their origin; originally intended to be in 12 books, corresponding to the number of months in the year, it was interrupted by Ovid's banishment, only six books, published after his death, being completed.

(3) *Poems of Exile*: *Tristia*, *Lamentations*, and *Epistulae ex Ponto*, *Letters from Pontus*, in which he bewails his lot, and endeavours, by somewhat undignified appeals, to induce the emperor to allow him to return.

Bibliography. Works, 9 vols., 1821; 5 vols., 1825; Eng. trans. H. T. Riley, 1851-52; Ovid, A. J. Church, 1880; Post Augustan Poetry, H. E. Butler, 1909; *The Art of Love*, trans. into English verse, B. P. Moore, 1935; selected works of Ovid, ed. J. C. and M. J. Thornton, 1939.

Oviedo. Maritime prov. of Spain. It corresponds with the ancient Asturias, which was its official name until 1833 and is still often used, and it occupies the N. slopes of the Central Cantabrian Mts. as far as the Bay of Biscay. The Narcea, Nalon, and Navia drain the slopes and provide water-power for the local industries, textiles, and glass-making. In the Nalon valley is the best coalfield in Spain. The mountainous S. impedes communications; the road and rly. to Madrid traverse the Pajares Pass, the other rly. skirts the coast and connects the ports of Gijón and

Aviles with Santander. Sugar-beet is a valuable crop. Its area is 4,206 sq. m. Pop. 862,345.

Oviedo. City of Spain, capital of the prov. of the same name. Situated on the edge of a fertile



Oviedo, Spain. Church of S. Miguel de Lino, now a national monument

plain where sugar-beet is extensively cultivated, it has national ordnance factories and manufactures of textiles, leather goods, chocolate, and matches. The cathedral, rebuilt 1388–1528, was one of the finest in Spain; it was severely damaged 1936. The church of S. Miguel de Lino or Lillo, built by Ramiro I in the 9th century, is a cruciform building and noteworthy for its carving. The university dates from 1604. During the Spanish Civil War the city was captured by Gen. Franco's troops, July 24, 1936, but resistance by Asturian miners went on. Pop. 86,724.

Oviparous (Lat. *ovum*, egg; *parere*, to produce). Obsolete term applied to those animals that deposit their eggs so that embryonic development takes place outside the mother's body.

Ovule. Botanical term, applied to the structure which normally after fertilisation becomes the seed. The outer part of an ovule consists of integuments which become the seed coat or coats, and in which an aperture, the micropyle, forms a channel for the entry of the pollen tube. At pollination time the micropyles of gymnosperm ovules are exposed so that pollen can alight on them. Angiosperm ovules are enclosed in ovaries so that the pollen tube must grow through the stigma and into the ovary to reach them. Within the integument(s) there is a nucellus (*q.v.*) enclosing during early stages of ovule development a cell which is haploid in contrast to the diploid structures around it. This cell in most gymnosperms grows into a female prothallus,

near the micropylar end of which several reduced archegonia, each with one egg cell, arise. In angiosperms the female gametophyte is the embryo sac.

Owari or **BISHIU.** Prov. of Japan, in Honshu. It is bounded S. by Ise Bay on the E. coast. It consists almost entirely of a fertile plain, the chief area in Japan for the production of rice, wheat, and barley. Horseradish has been dried and exported in large quantities. Poultry rearing is an important occupation. The local clay gave rise to the ceramic industry, which began at Seto village in 1297. Nagoya is the chief town.

Owen, JOHN (1616–83). English Puritan. He was born at Stadthampton, Oxfordshire, educated at Oxford, and became an Independent minister, going as chaplain with Cromwell to Ireland in 1649. Two years later he was appointed dean of Christ Church, Oxford, and in 1652 vice-chancellor of the university. At the Restoration he was expelled from office; but Charles II allowed him to minister to an Independent congregation in Leadenhall Street, London. He died Aug. 24, 1683.

Owen, SIR RICHARD (1804–92). British scientist. Born at Lancaster, July 20, 1804, and educated at Edinburgh, he entered the museum of the Royal College of Surgeons, London, 1826. Ultimately he became its curator, a post he held until 1856, when he was appointed superintendent of the natural history department of the British Museum. In 1836 he had been selected for the first Hunterian professorship of comparative anatomy. He is regarded as the greatest anatomist in the history of the science. He was made a K.C.B. 1884, and died Dec. 18, 1892.

Owen, ROBERT (1771–1858). British social reformer. Born at Newtown, Montgomeryshire, May 14, 1771, at 19 he was managing a cotton mill with 500 hands. In 1800 he became manager of and partner in the New Lanark Mills, and put into practice on a large scale the ideas which he had already imported into the management of workpeople. His main principle was that the best work can only be expected from happy,

prosperous, and educated employees. With the aid of Jeremy Bentham, he converted his business into a philanthropic trust for his workpeople, the capital being allowed a fixed remuneration of five p.c. The colonies established by Owen—at Orbiston, in Lanarkshire, and at New Harmony, Indiana, U.S.A.—were unsuccessful and involved him in heavy financial losses. By 1828 he had completely severed his connexion with New Lanark, and devoted the rest of his life to the exposition of his socialistic theories. He died Nov. 17, 1858. His works include *A New View of Society*, *A New Moral World*, and an *Autobiography*. See *Co-Partnership*; *Socialism*; *consult* *Lives*, L. Jones, 1890; F. Podmore, 1906; G. D. H. Cole, 1930.

Owen, WILFRED (1893–1918). British poet. Born at Plas Wilmot, Oswestry, Mar. 18, 1893, he was by some critics considered the most promising of the young poets of his day. He served throughout the First Great War in the infantry on the western front, being killed Nov. 4, 1918, one week before the armistice. Editions of his works were published in 1920 and 1931. The *MSS.* of his poems, the most significant of which expressed a passionate lyrical protest against the horrors of the war, and showed the influence of Keats, were presented to the British Museum, 1934.

Owen Falls Dam. Hydro-electric project to harness the waters of the White Nile, near its source in Lake Victoria, Uganda. The four-fold cataract of Owen Falls, 65 ft. deep, is 2½ m. downstream from Ripon Falls, where the river leaves the lake, and is close to the town of Jinja. The scheme was first envisaged in 1935, and a report was made to the Uganda govt. in 1947. The consent of Egypt having been obtained, work was begun in 1949. The first stage (construction of the dam and installations of turbines producing 90,000 kW.) was to be completed in 1953; further turbines, increasing the output to 150,000 kW, were to be installed by 1960. The project was expected to hasten the industrialisation of Uganda and to benefit Egypt by giving control of some of the flood waters upon which her agriculture depends. The raising of the level of Lake Victoria and the disappearance of Ripon Falls (to be ultimately destroyed by blasting) are elements in the scheme. The cost was estimated at £12 million, of which £4 million was to be contributed by Egypt.



Sir Richard Owen, British scientist

Owens, JOHN (1790 - 1846). British merchant. He was born in Manchester, where he amassed a large fortune, the residue of which, amounting to £96,000, he left in trust for the foundation of a college, with the proviso that no theological tests should be required. Owens College was accordingly founded and opened in 1851. See Manchester University.



John Owens.
British merchant.
From a medallion by
G. T. Woolner, R.A.

Owensboro. City of Kentucky, U.S.A., the co. seat of Daviess co. It stands on the Ohio, 115 m. by rly. S.W. of Louisville, and is served by Louisville and Nashville and other rlys. A considerable river trade is carried on, chiefly in tobacco, the processing of which is the city's main industry. Other industries are the manufacture of carriages and wagons, timber products, electric bulbs, and radio valves. Oil is obtained in the neighbourhood, and cattle-rearing is an important feature of the surrounding countryside. Owensboro was settled in 1797 and chartered as a city in 1866. Population 30,245.

Owen Sound. Town and port of Ontario, Canada. On Owen Sound where the Sydenham river falls into Georgian Bay, and 110 m. from Toronto, it is served by the C.N. rlys. and the C.P.R., and is a port for steamers to the Great Lakes and the St. Lawrence. Population 14,002.

Owl. Order of nocturnal birds of prey (*Strigiformes*). They are externally distinguished by their large heads and the radiated ruffs of feathers around the large eyes. Owing to their loose, outstanding plumage, most owls look much larger than they really are. They are noted for their silent flight and their keenness of vision at night. They feed mainly on small rodents. Twelve British species are known.

The barn owl (*Tyto alba*) is the best known in the U.K. and is common nearly everywhere except in the towns. Its plumage is tawny yellow above, with white face and under parts. In its nocturnal hunting it never wanders far from its abode, often a church tower or hollow tree. It utters a strident and discordant scream, from which it is sometimes known as the screech-owl. The long-eared

owl (*Asio otus*) is about the same size, but darker, with erect tufts of feathers above the eyes. It is gregarious, lives in dense pine woods, varies its diet of small birds with insects, and generally breeds in the deserted nest of a crow or magpie.

The short-eared owl (*Asio flammeus*) is yellowish brown, with a buff face and short tufts of dark feathers on the head. It has a smaller head and is less owl-like in appearance than the other species. A migratory bird, it visits Great Britain chiefly in winter, breeding in the N. of England and in Scotland, where it nests on the ground on moors. It is not strictly nocturnal, and feeds upon rodents and small birds.

The tawny owl (*Strix aluco*), often called the brown or wood owl, is larger in size, with reddish brown plumage above, and reddish white barred with brown below, and is not uncommon in most wooded districts of England and Scotland, but is not native in Ireland. This is the species that utters the well-known hooting cry. It makes its home in hollow trees.



Owl. 1. Long-eared (*Asio otus*).
2. Short-eared (*Asio flammeus*)
W. S. Berridge, F.Z.S.

sional visitants to Great Britain. See Eggs colour plate; Feather.

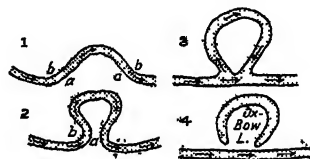
Owyhee. River of Oregon, U.S.A. Its headstreams rise in Nevada and Idaho, and after their junction the river flows in a general N. direction to the river Snake. Its length is 370 m.

Ox. Word of Anglo-Saxon origin, used for the male of the different species of the Bovidae. Oxen is one of the few existing forms of the old plural *en*. From

the Middle Ages the ox has been extensively used for ploughing and hauling. See Bovidae; Cattle.

Oxalic Acid ($\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$). A solid organic acid first prepared from wood sorrel (*Oxalis acetosella*), in which plant it occurs as the acid potassium oxalate. The acid is made on the commercial scale by Dale's process, which consists in fusing sawdust from soft woods, with a mixture of caustic potash and soda, or by heating sodium formate, made synthetically from caustic soda and carbon monoxide. The acid is largely used in calico printing and dyeing, and in the preparation of formic acid and synthetic dyes. It bleaches straw and flax, and cleans brass and other metals.

Ox-Bow. Name of a kind of lake. In their flood-plain courses, rivers meander to such an extent



Ox-Bow. Diagram illustrating how a meandering river may (1) increase its meander (2) cut through the loop as in 3, and eventually flow straight, forming an ox-bow lake (4)

that great loops are formed. Eventually the river cuts through the neck of the loop and straightens itself, leaving a horseshoe-shaped backwater, which becomes a cut-off or ox-bow lake when the deposition of silt blocks up the ends. Ox-bow lakes may reach 5 m. in diam. in the lower valleys of such rivers as the Mississippi. See Lake.

Oxenham, JOHN. Pseudonym of a British writer. W. A. Dunkerley (d. 1941) was educated at Old Trafford school and Victoria university, Manchester. He abandoned a commercial career for writing, publishing in 1898 *God's Prisoner*, a novel. His verse, in style a reflection of Whitman and Carpenter, in sentiment religious and idealistic, enjoyed a vogue during the First Great War; his Hymn for the Men at the Front was reputed to have sold 8,000,000 copies. His popular works included *Bees in Amber*; *A Little Te Deum*; *Christ and the Third Wise Man*, 1934; *Wide Horizons*, 1940. He died Jan. 23, 1941. Consult Scrap-books of John Oxenham, E. Oxenham, 1946.

Oxenstierna or **OXENSTJERNA**. Name of Swedish family, frequently referred to as Oxenstiern. The

most distinguished member was Axel (v.i.), but others were Bengt Gabrielsson (1623-1702), who defended Thorn against the Poles, was chancellor under Charles XI, and represented Sweden at the congress of Nijmegen; and Gabriel Thureson (1641-1707), ambassador at the congress of Ryswick, who lost influence by his conversion to Catholicism. John Gabriel (1750-1818) was a poet and a scholar.

Oxenstierna OR OXENSTJERNA, AXEL GUSTAFSSON, COUNT (1583-1654). Swedish statesman. Born at Fanö, June 16, 1583, he studied theology in Germany, served Charles IX in diplomatic missions, and became chancellor under Gustavus Adolphus, 1611. He accompanied the king on the Russian campaigns, negotiated the treaty of Stolbova, 1617, and was governor-general of Prussia during the Swedish occupation. He opposed Swedish participation in the Thirty Years' War, but ably supported his king in Germany, acted as regent after his death, 1632, and became

a pivot of the Protestant alliance throughout the struggle. He negotiated the Danish treaty in 1645, and unsuccessfully opposed the abdication of Christina of Sweden. He died Aug. 28, 1654. *See* Sweden: History; Thirty Years' War.

Ox-eye Daisy (*Chrysanthemum leucanthemum*).



Ox-eye Daisy or Dog Daisy

Dog-daisy, perennial herb of the family Compositae. A native of Europe and N. and W. Asia, it has spoon-shaped, deeply cut leaves, and daisy-like flower-heads, 2 ins. across. The rays are pure white, the disk-florets yellow. This is a common weed of meadows and pastures in the U.K.

Oxford. City, co. bor., and co. town of Oxfordshire, England. It is on the Thames, here called the Isis, which sweeps round the W. and S. of the city, and is here joined by the Cherwell. It is

63 m. by rly. and 54 m. by road W.N.W. of London. At Carfax, the centre of the old city, four streets meet:

High Street, one of the most picturesque thoroughfares in Europe, Cornmarket, Queen Street, and St. Aldate's.

Across Magdalen Bridge, at the other end of the High Street, are modern suburbs. In N. Oxford, at Summertown, are numerous villas. The chief industries are steel pressing, motor works, and catering for members of the university; there are also breweries and a big cattle market.

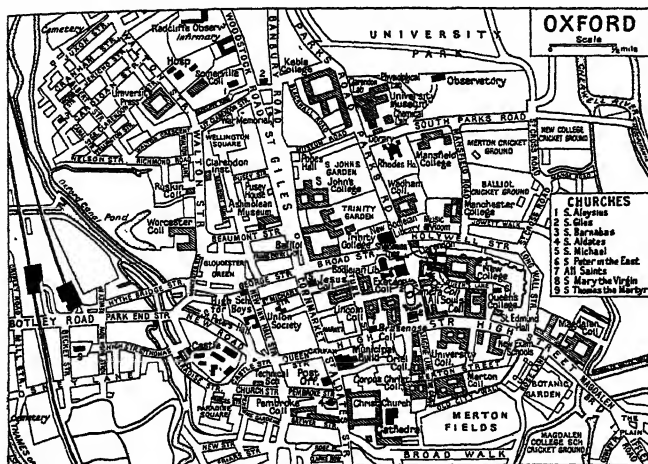
The partly Norman cathedral, formerly the priory church of S. Frideswide, is included in Wolsey's foundation of Christ Church. Other interesting churches are the university church of S. Mary the Virgin (damaged by fire in 1946), S. Peter in the East, S. Giles, S. Barnabas, S. Aldate, and S. Michael. All Saints is the city church. Apart



Oxford arms



Oxford. Air view of the city from the E. 1. Pembroke College. 2. Christ Church. 3. Corpus Christi College. 4. Merton College. 5. Town Hall. 6. Oriel College. 7. Jesus College. 8. St. Mary's Church. 9. Lincoln College. 10. Exeter College. 11. Broad Street. 12. Balliol College. 13. Trinity College. 14. Brasenose College. 15. Radcliffe Camera. 16. Bodleian Library. 17. Sheldonian Theatre. 18. Clarendon Building. 19. Bodleian Library extension. 20. Indian Institute. 21. All Souls College. 22. Hertford College. 23. Examination schools. 24. University College. 25. High Street. 26. Queen's College. 27. New College. 28. Old City Wall. 29. Botanic Garden. 30. Magdalen College



Oxford. Plan of the university city showing position of the colleges and churches

from the colleges, museums, libraries, and other university buildings, the chief edifices are the municipal buildings, the castle, and the high school for boys. There are extensive remains of the old town walls.

Although Oxford owes so much of its prosperity to its university, it was important before that was founded. It was certainly so under the later Anglo-Saxon kings, and its position on the Thames was such that the Normans fortified it strongly. It received its first charter of incorporation about 1100. Mand was besieged here by Stephen in 1142, and the Provisions of Oxford were drawn up by the Mad Parliament in 1258. Charles I, when driven from London, made Oxford his headquarters, and Charles II called a parliament here in 1681. The bishopric was founded at the Reformation.

The city is governed by an elected council, but three aldermen and nine councillors represent the university. This divided authority, which originated about the 14th century, has not always worked as amicably as it does today. The city sends one member to parliament; from 1295 to 1885 it sent two. The municipal waterworks date from 1615. In 1928 the city boundaries were extended, taking in the urban district of Headington and the Morris motor works at Cowley. A movement was started to prevent the surroundings from being spoiled by building. There is also the Oxford Preservation Trust. Pop. est. 103,570.

Bibliography. Oxford and the Colleges, G. Smith, 1895; The Cathedral Church of Oxford, P. Dearmer, 1899; Story of Oxford, C. Headlam, 1907; Oxford, A. Lang, new ed.

1916; The Charm of Oxford, J. Wells, 1920; An Oxford University Chest, J. Betjeman, 1938; Oxford, C. Hobhouse, 1938; Oxford Re-planned, T. Sharp, 1948.

Oxford, EARL OF. English title held successively by the families of Vere and Harley. The great Norman family of Vere was represented in the time of William the Conqueror by Aubrey de Vere, the holder of extensive lands. In 1133 his descendant was made lord great chamberlain, and the earls of Oxford held that office until 1625. In 1142 another descendant was made earl of Oxford.

Robert, 9th earl (1362-92), was made duke of Ireland. He was a close friend of Richard II, and lost his honours, but the title was restored to his descendants, one of whom, John, 12th earl, was executed as a Lancastrian in 1462. His son, John, 13th earl (1443-1513), was also a prominent Lancastrian. Edward, 17th earl (1550-1604), was a typical Elizabethan, a gallant and writer of verse, also a spendthrift. Henry, 18th earl, died in 1625, when the great chamberlainship passed from the Veres. Aubrey, 20th earl, died in 1703, and the title became extinct.

In 1711 the statesman Robert Harley was made earl of Oxford. He was succeeded by his son Edward (1689-1741), who had no sons. The 3rd earl was therefore a cousin, Edward (d. 1755), in whose line the title remained until the death of Alfred, the 6th earl, in 1853, when it became extinct until revived in a slightly different form in 1925 for the 1st earl of Oxford and Asquith (*q.v.*). See Vere.

Oxford, ROBERT HARLEY, 1ST EARL OF (1661-1724). English statesman. Born in London,

Dec. 5, 1661, he entered parliament in 1689. Coming soon to the fore, he carried through the Triennial Bill, 1694. He was Speaker 1701-05, and in 1706 was appointed a commissioner for the union with Scotland, and secretary of state for the southern English statesman department. By this time he had obtained influence over Queen Anne.



1st Earl of Oxford, English statesman After Kneller

Assisted by his cousin, Abigail Hill, afterwards Lady Masham (*q.v.*), he destroyed the Marlborough interest, and in 1710 became chancellor of the exchequer and virtual prime minister. Despite the jealousy of the high Tory ministers and the bitter opposition of Marlborough and Godolphin, secret negotiations with France were begun in 1711, and the peace itself was signed two years later. Early in 1711 Harley had been created earl of Oxford and made lord high treasurer.

In 1714 Bolingbroke, disappointed by Harley's refusal to further his schemes for a restoration, began to plot against him, and persuaded Anne, a month before she died, to dismiss her minister. The next year Harley was impeached for concluding the French treaty, and was committed to the Tower, where he remained until 1717, when the impeachment fell through, though he was omitted from the Act of Grace. Harley died in London, May 21, 1724. A man of wide literary tastes, in 1705 he began the collection of books and MSS. which is famous as the Harleian MSS. (*q.v.*), preserved in the British Museum. *Consult* Life, Roscoe, 1902.

Oxford and Asquith, HENRY HERBERT ASQUITH, 1ST EARL OF (1852-1928). British statesman.



1st Earl of Oxford and Asquith, British statesman

Born Sept. 12, 1852, at Morley, Yorks, he was educated at the Moravian School, Pudsey, the City of London School, and Balliol College, Oxford, to which he won a classical scholarship. At Oxford he was Craven scholar and president of the Union, and was made fellow of Balliol. Called to the bar at Lincoln's Inn, 1876, he

was for a time a university extension lecturer and a contributor to *The Economist*. His reputation was made by his work as junior counsel for the Irish Nationalist party during the Parnell commission, 1889.

Meanwhile in 1886 Asquith had won E. Fife as a Gladstonian Liberal, and he held the seat uninterruptedly until 1918. When the Liberals came to power in 1892 Gladstone appointed him home secretary. During his three years in that office he was responsible for the strengthening and reorganizing of the factory inspectorate, including the establishment of women inspectors, and for the re-establishment of the right of public meeting in Trafalgar Square. On Rosebery's retirement from the Liberal leadership in 1896, Asquith supported him, and during the S. African War became a conspicuous figure (with Grey and Haldane) in the Liberal Imperialist group. He was the most formidable antagonist of Chamberlain's tariff reform agitation, 1903-05. In Campbell-Bannerman's administration of 1905 he became chancellor of the exchequer. While in that office he laid the foundation of the old age pensions scheme, and distinguished for the first time between earned and unearned income for the purpose of taxation.

Eight Years as Premier

On Campbell-Bannerman's retirement, April, 1908, Asquith succeeded to the premiership, which he held continuously until Dec., 1916. The rejection by the upper house of the 1909 budget led to the prolonged conflict between the house of commons and the house of lords which dominated home politics for the next few years. For the narrow Liberal victories in the two resulting general elections of 1910 Asquith's own prestige was largely responsible; and he displayed high skill and courage in carrying the Parliament Act of 1911, by which the lords' absolute veto was reduced to a suspensory one. It was at one stage in the progress of this measure, in Aug., 1911, that he was howled down and refused a hearing in the house by an unruly section of his opponents, who accused him of being a traitor for having secured the king's consent to create new peers sufficient to ensure the passing of the measure. It was also at this period that he used with great effect the phrase "Wait and see"; originally uttered as the warning to his

opponents of a strong man who had made up his mind, the words were later unfairly quoted against him to suggest a dilatoriness in his own decisions.

Asquith had personal conduct of the negotiations which ended the coal strike of 1912, and was then called to face the angry passions aroused by the introduction of the Irish Home Rule Bill. The Ulster leaders, under Carson, threatened open revolt. Asquith strove to reach an agreed solution. His compromise giving the northern counties of Ireland exemption from Home Rule for five years was rejected by Ulster, and the threatened resignation of Army officers at the Curragh in the spring of 1914 led him to take on the additional office of war secretary. Whether or not he could have prevented civil war was left for ever in doubt by the sudden European crisis and the outbreak of the First Great War.

In the earliest months of that conflict, Asquith's speeches, firm in tone, and noble in temper, did much to win respect abroad for British policy and aims, notably his statement at the Mansion House, Nov., 1914: "We shall never sheathe the sword, which we have not lightly drawn, until Belgium has recovered all or more than she has lost." But in the months that followed the conduct of the war began to be criticised, notably the lack of suitable munitions, and in May, 1915, Asquith acceded to Conservative demands by forming a coalition govt., in which he remained prime minister. Further serious dissensions within the cabinet culminated in Lloyd George's proposal for an inner war cabinet from which the premier should be excluded. On Asquith's rejection of this, Lloyd George and others resigned, a move which led to Asquith's own resignation, and his supersession by Lloyd George, Dec., 1916.

In the 1918 election Asquith, as an independent Liberal, was defeated by a Conservative supporter of Lloyd George. The latter, when forming his new govt., was prepared to offer Asquith the office of lord chancellor. This was refused, but Asquith hoped to be allowed an important place in the delegation to the peace conference. Lloyd George, however, refused this. In 1920 Asquith was returned at a by-election for Paisley, and resumed his leadership, first of the independent Liberal opposition, then in 1923 of a superficially reunited Liberal op-

position. After the 1923 election, holding the balance between the Conservative and Labour parties, he elected to unseat the Baldwin govt., and to be thereby directly instrumental in setting up the first Labour govt. In the same year, he brought about the defeat of the Labour govt., but lost his seat at the general election following.

In 1925 he was created earl of Oxford and Asquith, and in 1926 resigned his leadership of the Liberal party, after further disputes with Lloyd George. He died Feb. 15, 1928, succeeded in the title by his grandson, Julian.

His contribution to British political life included a fine intellect, sound judgement, intense probity, and a reasoned philosophy of government. He was a man of great dignity and extraordinary magnanimity.

His autobiographical writings were *Fifty Years of Parliament*, 1926, and *Memories and Reflections*, 1928. He also wrote *The Genesis of the War*, 1923; and his collected speeches were published 1927. An official *Life*, by J. A. Spender and Cyril Asquith, was published 1932. His *Letters to a Friend*, ed. D. McCarthy, appeared in two series, 1933 and 1934. Asquith was twice married, first in 1877 to Helen Melland, who died in 1891, secondly in 1894 to Emma Alice Margaret (Margot) Tennant (v.s.). See Asquith, Anthony; Asquith, Herbert; Asquith, Raymond; Liberal; Lloyd-George, 1st Earl; Parliament Act.

Oxford and Asquith, EMMA ALICE MARGARET (Margot), COUNTESS OF (1864-1945). British



The Countess of Oxford and Asquith (Margot), British writer

writer. Sixth daughter of Sir Charles Tennant, she married in 1894 H. H. Asquith, later 1st earl of Oxford and Asquith (v.s.). She was one of the most brilliant and witty hostesses of her day, a member in her youth of the politico-literary coterie known as the "Souls." In 1922 she enjoyed a big success with a frank and lively *Autobiography*. Later publications included *Places and Persons*, 1925; *Lay Sermons*, 1927; *More Memories*, 1933; and a novel, *Octavia*, 1928. She died July 28, 1945. Anthony Asquith (q.v.) was her son.

Oxford and Cambridge Club. London social club. Founded in 1830, Lord Palmerston being among its originators, its first house was in St. James's Square, where it remained until a fine building was erected in 1838 by Sir Robert and Sydney Smirke, at 71-76, Pall Mall. Membership is restricted to men educated at either of the two universities.

Oxford English Dictionary. Dictionary of the English language published by the Oxford University Press. Begun in 1884, it was completed in 1928; the final edition, with a supplement devoted to words coined too late for inclusion in the main work, was published in 1933. The editors were Sir James Murray, Henry Bradley, Sir William Craigie, and Dr. C. T. Onions. The 13 vols. contain 16,400 pages covering 414,825 words, not only of modern English but also of the obsolete English of Chaucer, the Bible, and Shakespeare; of 240,165 main words in the dictionary, 52,464 are obsolete and 9,731 are alien. The cost of production was £300,000. The work is universally regarded as the ultimate authority on English. A Shorter Oxford English Dictionary of 2,500 pages was projected in 1902, but not published until 1933. The Concise Oxford Dictionary, adapted by F. G. and H. W. Fowler, was first pub. 1911, and the Pocket Oxford Dictionary in 1924.

Oxford Group. Evangelical movement founded in Oxford by Dr. Frank Buchman (*q.v.*) in 1921. Leaders were trained at various British and American universities, and by 1928 the crusade to convert the world from militant materialism to practical Christianity was launched. The name Oxford Group was first applied when eight students visited S. Africa in 1928.

The movement received the blessing of such figures as the archbishop of Canterbury, Lord Bennett, J. H. Hofmeyr, Bishop Berggrav, and Gen. Chiang Kai-shek. It taught that its followers must undergo a "change of heart," to be achieved by setting aside a period in the early morning (the "quiet time") in which they listened for the guidance of God. By 1937 the movement had spread to over 50 countries. Adverse criticism was aroused by the somewhat flamboyant personality of Buchman, and by the conversion of the movement into an association under the Companies Act in 1939; also because several prominent members declared in favour

of pacifism at a time when that was not a popular doctrine in England. The practice of public confession was also criticised.

In 1938 Buchman launched his Moral Rearmament campaign from East Ham town hall. During the Second Great War he toured the U.S.A., Canada, and Australia, and in 1941 the method of spreading the light by dramatic presentations was introduced. In 1946 the group bought the Westminster Theatre, London, but its productions did not attract much attention. It has offices at 4, Hay's Mews, London, W.1. See Moral Rearmament.

Oxford House. E. London community centre. Founded as an Anglican university settlement by members of Oxford university in 1884, the house in Mape Street, Bethnal Green, was later recognized by the local education authority as a community centre. It runs clubs for men, women, and children of all ages. There is residential accommodation for some 20 men and women, including the full-time staff of club leaders, etc. During the university vacations, courses are run in neighbourhood work and social background for students entering various professions. Contact is maintained with two daughter settlements, University House and S. Margaret's House, the latter for women only.

Oxfordian Beds. In geology, name given to the lowest subdivision of the Upper Jurassic rocks. They are typically developed in Oxfordshire, England, and are found in most districts from Dorset to Yorks. See Jurassic.

Oxford Movement. Name given to the movement for reforming the life and worship of the Church of England that began at Oxford in 1833. At that time the Church in general was in the state of lethargy into which it fell during the 18th century, and a number of Oxford men conceived the idea of making it more vigorous and powerful by increasing the number of services, reminding the clergy of their varied duties, and rendering it more than a mere adjunct of the state. An essential feature was the restoration of some of the ceremonial of worship that had fallen into disuse since the Reformation, and it was here that strong opposition was aroused. It was also called the Tractarian Movement because its aims were set forth in Tracts for the Times, a volume by various writers first published in 1834, while the adherents of the movement were called High

Churchmen or, by their foes, Ritualists. See Church of England; Keble; Newman, J. H.; Pusey; consult The Oxford Movement, R. W. Church, 1891; Secret History of the Oxford Movement, W. Walsh, 5th ed. 1899.

Oxfordshire. South Midland county of England, known sometimes as Oxon. Its area is 749 sq. m. Of very irregular shape, it is bounded on the S. by the Thames. In the S.E. are the Chiltern Hills, reaching up to 700 ft., and near Oxford are some lesser heights. Spurs of the Cotswolds enter the county, but the rest of it is undulating or flat. The chief rivers, tributaries of the Thames, are the Windrush, Cherwell, Thame, and Evenlode.

Oxfordshire is an agricultural county, producing barley, wheat, oats, and various vegetables, while cattle, sheep, and pigs are reared. Paper is made in several villages. The co. is served by main rlys. and the Oxford Canal. Oxford is the county town; other places of note are Banbury, Henley-on-Thames, Chipping Norton, Bicester, Thame, and Witney. The county contains historic and picturesque places such as Woodstock, Burford, Bampton, Dorchester, once the centre of a great bishopric, Blenheim, Great Tew, Nuneham, and Goring. Broughton and Shirburn castles are two great houses.

Of religious houses there are remains at Dorchester, Godstow, and elsewhere. There are beautiful churches at Bloxham, Langford, Iffley, and Adderbury. Herein, too, are the remains of Wychwood Forest. The co. elects two M.P.s, the county constituencies being Henley and Banbury. Before the Norman Conquest Oxfordshire was part of Mercia. Later it was ravaged by the Danes and was made into a county. Many historic events took place at Oxford, and during the Civil War there was much fighting. Pop. 209,621.

LITERARY ASSOCIATIONS. Among writers born in the county may be mentioned Sir Henry Maine, at Caversham Grove; George Rawlinson, at Chadlington; Maria Edgeworth, at Black Bourton; Charles Reade, at Ipsden. Of Islip, Robert South (1634-1716) and William Buckland, the geologist, were rectors. At South Leigh, John Wesley preached his first sermon, 1725.



Oxfordshire. Seal of the county council



Oxfordshire. Map of the South Midland county of England, famous for its pastoral beauty and historical associations

Woodstock gives its name as title to one of Sir Walter Scott's novels, much of the action of which takes place in the county. At Woodstock, too, centre the many stories of Fair Rosamond, who is buried at Godstow. At Henley, Shenstone is supposed to have written his famous lines on an inn. Pope stayed at Stanton Harcourt, Bablock-Hythe and other places around Oxford are associated with Matthew Arnold's Scholar Gypsy. Kelmscott, on the Thames side near the Gloucester border, was for some time the home of William Morris, and there he is buried. The Victoria History of the co., ed. W. Page, appeared in 1907.

Oxfordshire and Buckinghamshire Light Infantry. Regiment of the British army. It was originally the 43rd and 52nd Foot, raised in 1741 and 1755 respectively, the two being united as the Oxfordshire and Buckinghamshire Light Infantry in 1881. The 43rd served under Wolfe at the capture

of Quebec in 1759 and in the West Indies. Both it and the 52nd fought in the American War of Independence. The 52nd served for many years in India, fighting in

Mysore and elsewhere, before going to Spain in 1800. In 1801 the two, together with the 95th, were placed under Moore and reorganized as the first British regiments of light infantry. Their deeds as the famous light division in the



Oxford and Bucks Light Infantry badge
Peninsular War are immortalized in Napier's History. At Waterloo the 52nd repulsed the Old Guard. The regiment was engaged in the Kaffir War, 1851-53, and a detachment was on the Birkenhead when she was wrecked in 1852. It won honour during the Indian Mutiny, served in New Zealand, 1864-66, and in the Tirah campaign of 1897. In the S. African War the regiment was at the relief of Kimberley and at Paardeberg.

Seventeen battalions were raised for service in the First Great War and earned the battle honours: Mons; Ypres, 1914, '17; Langemarck, 1914, '17; Nonne Bosschen; Somme, 1916, '18; Cambrai, 1917, '18; Piave; Dorian, 1917, '18; Ctesiphon; Kut. In the Second Great War battalions served in Europe, Burma, N. Africa, and Italy, suffering particularly heavy casualties at Salerno. The regimental depot is at Oxford.

Oxford Street. London thoroughfare. It runs W. from New Oxford Street, a link with Holborn, to join the Bayswater Road at the Marble Arch, W. Where it crosses Regent Street is Oxford Circus. New Oxford Street, opened in 1847, covers the site of the "rookery" of S. Giles. Oxford Street, named after Edward Harley, earl

of Oxford, early in the 18th century, was formerly Tyburn Road, being part of the route from the Old Bailey to the gibbet at Tyburn (q.v.). In the 20th century it became one of the main shopping centres of London's W. end. The Princess's Theatre (q.v.) was at No 152. In Oxford St., called by him a "stony-hearted step-mother," De Quincey met the Ann of his Confessions.



Oxford Street, London. View of this busy shopping thoroughfare looking west from New Bond Street

Oxford University. Senior of the two ancient English universities, dating from the reign of Henry II. Its development began about 1167, when foreign born scholars were driven from Paris. In 1214 came the first university charter, whereby the townsmen undertook to pay to the university a small tribute which still survives. There was much rioting between town and gown during the 13th and 14th cent.; but the university, supported by church and king, grew steadily stronger.



Oxford University arms

By 1546 Henry VIII had handed over Wolsey's property and buildings, licensed in 1525 as Cardinal college, to the dean and canons of the cathedral, which was and is part of Christ Church (The House). In 1571 the university was incorporated by Act of parliament. The statutes made by Archbishop Laud, chancellor of the university, and introduced in 1636, were amended in 1760 after a great struggle. The constitution was again revised in 1854, and in 1877. In 1871 religious tests were abolished. The royal commission of 1919, and the statutory commission which followed, led to the receipt of an annual Treasury grant.

The colleges, halls, and societies are independent corporations. The colleges (other than new foundations) make financial contributions to the university. To become a member of the university ("matriculate"), it is necessary first to be admitted by a college, hall, or society. These are: University (1249); Balliol (1263); Merton (1264); Exeter (1314); Oriel (1326); Queen's (1340); New College (1379); Lincoln (1427); All Souls (1438); Magdalen (1458); Brasenose (1509); Corpus Christi (1520); Christ Church (1546); Trinity (1554); S. John's (1555); Jesus (1571); Wadham (1612); Pembroke (1624); Worcester (1714); Hertford (1740); S. Edmund hall (1317). New foundations are: Keble (1870); S. Peter's hall (1928); S. Catherine's society (non-collegiate body) (1868); two permanent private halls, Campion and S. Benet's; Nuffield (1937); St. Anthony's (1950). The recognized societies of women students are Lady Margaret hall (1878); Somerville (1879); S. Hugh's

(1886); S. Hilda's (1893); S. Anne's society (formerly society of Oxford home-students) (1879).

The head of the university is the chancellor, usually some illustrious non-resident member; the acting head is the vice-chancellor, a chosen head of one of the colleges, nominated annually by the chancellor and usually holding office for three years. Two proctors, elected annually by the colleges in turn, are responsible for the discipline of the university. From 1604 to 1945, the university returned two members to parliament.

The governing bodies are: the hebdomadal council (five ex-officio members and 18 elected members), through which all legislative proposals must pass; the congregation of the university (most members of which are resident graduate teachers or on the administrative staff), in which is vested nearly all the legislative power; and convocation (all masters and doctors on the books, but retaining few duties). The curators of the university chest manage finance. The general board of the faculties supervises the studies and examinations of the university and the work of the 14 faculty boards.

Degrees are given in arts, divinity, law, medicine, music, letters, science, and philosophy. Normally an undergraduate takes an arts course of three or four years leading to the B.A. degree. For this he must pass three examinations: responsions (from which he can secure exemption); the first public examination—an intermediate examination in the candidate's subject; the second public examination—either a final honour, or a final pass, school. At the end of seven years from matriculation a B.A. may be admitted to the degree of M.A. without further examination. There are research degrees for those who have already been admitted to a first degree.

University property in Oxford includes the Bodleian library, the Ashmolean museum, the Sheldonian theatre, the university observatory, under the direction of the Savilian professor of astronomy. There are 89 professorships; many are ancient chairs, the oldest being the Lady Margaret professorship of divinity (1502). Five Regius professorships, divinity, medicine, civil law, Hebrew, and Greek, were founded by Henry VIII. In 1937 Lord Nuffield founded four medical professorships.

In 1914 there were 4,025 undergraduates; in 1938–39, 6,659; in

1948, about 8,000. Many social activities and sports are offered by university and college clubs. The Union society provides weekly debates; the Oxford university dramatic society (O.U.D.S.) is famed. The events held every year against Cambridge university (*q.v.*) entitle the participants to a "Blue" (*q.v.*). See also separate entries under the colleges and other institutions of the university.

W. M. Gibson

Bibliography. Oxford and its Story, C. Headlam, 1912; History of the University of Oxford, Sir Charles Mallet, 1924; Oxford—its place in National History, J. A. R. Marriott, 1933; Degrees by Degrees, A. M. A. H. Rogers, 1938; Oxford, C. Hobbhouse 1939; Oxford University Handbook (annually).

Oxford University Press. Oldest institution of its kind in the world. It has been continuous since 1585, and the Bible section since 1675. Printing was carried on in the Sheldonian theatre from 1669 to 1713, and the Clarendon Building in Broad Street until 1830, when the press removed to extensive premises in Walton Street. The type foundry is the oldest in England.

The associated name of the Clarendon Press dates from 1713, when, from the profits of Clarendon's History of the Rebellion, new offices were erected. The London publishing house is at Amen House, Warwick Square, London; the paper mill at Wolvercote, near Oxford. There are branches in Glasgow, Melbourne, Cape Town, New York, Toronto, Bombay, and Madras.

Oxidation. Term used in chemistry to describe a process whereby oxygen is given to another substance, or is made to remove hydrogen from a substance. Examples are the interaction between sulphurous acid and hydrogen peroxide when oxygen is given to the former substance, or the oxidation of sulphuretted hydrogen when hydrogen may be removed. The converse of oxidation is called reduction. Many important reagents are used in organic chemistry to effect oxidation, *e.g.* nitric acid, potassium permanganate, potassium dichromate and sulphuric acid, chromium trioxide and glacial acetic acid. See Oxygen.

Oxides. Compounds of elements with oxygen. Except fluorine and the inert gases, all elements form at least one such compound, and some two and even more. With electro-negative

elements (metals), oxygen forms basic oxides, and with electro-positive elements, acidic oxides. Between the extremes there is a fairly continuous series, and intermediate oxides may behave as



Oxlip. Leaves and flower-spray; inset, roots

either acidic or basic compounds according to conditions. Oxygen itself being electro-positive, where more than one oxide is formed, the higher tends to be more acidic; thus chromous oxide (Cr_2O_3) is basic, forming salts with acids, e.g. chromous sulphate, $\text{Cr}_2(\text{SO}_4)_3$, with sulphuric acid; whilst chromic oxide (CrO_3) is acidic, forming salts with bases, e.g. potassium chromate (K_2CrO_4) with potassium oxide. As to sulphur, both oxides SO_2 and SO_3 are acidic, but sulphuric acid, the former, is much stronger than sulphurous acid.

As an example of an intermediate (amphoteric) oxide, alumina (Al_2O_3) may be taken. With strong bases such as soda (NaOH) it forms salts (aluminates), which are, however, readily decomposed on diluting with water. The hydrated oxide precipitated is readily soluble in acids to form salts, e.g. aluminium sulphate $\text{Al}_2(\text{SO}_4)_3$. Carbon monoxide (CO) is neutral, but the higher oxide CO_2 is definitely acidic. Similarly with nitrogen, the lowest oxide (NO) is neutral, the next (N_2O_3) forms the weak nitrous acid (HNO_2), whilst the higher oxide N_2O_5 forms the strong nitric acid, HNO_3 .

PEROXIDES. Some of the higher oxides, e.g. BaO_2 , are unstable, readily decomposing on heating or on dilution with water. They then liberate oxygen gas, leaving the lower oxide (e.g. BaO).

OXIDE ORES. Many important metals exist in nature as oxides. The various oxides of iron, varying in colour from yellow and pale green to purple and black, occur almost everywhere and are mainly responsible for the range of colours

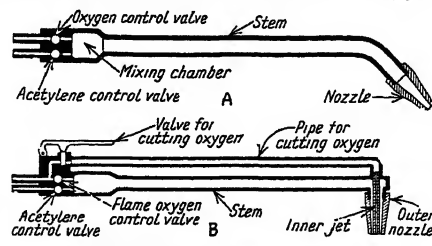
exhibited by earths, sands, and rocks. The most useful natural iron oxide ores are the haematites (Fe_2O_3) and spathic iron ore. Other naturally occurring metallic oxides of industrial importance are cuprite (copper ruby ore), zincite (zinc oxide, ZnO), and cassiterite or tinstone (SnO_2).

Oxlip (*Primula elatior*). Perennial herb of the family Primulaceae. It is a native of Europe and Siberia. In England it is restricted to the counties of Bedford, Cambridge, Suffolk, and Essex. Its flowers are similar in size and colour to those of the primrose with short individual stalks springing from the top of a stout, tall stem like that of the cowslip. The garden flower commonly called oxlip is a hybrid between primrose and cowslip.

Ox-Pecker or **RHINOCEROS BIRD** (*Buphaga*). Bird found in Africa. It is dull brown above and light brown beneath, and about the size of a starling. Insectivorous, it gets its name from the habit of settling on the backs of the ox and rhinoceros to search for parasitic insects.

Oxus. Ancient name of the river now the Amu-Daria (q.v.).

Oxyacetylene Blowpipe or **TORCH.** Instrument used for mixing and burning oxygen and acetylene gases together. It produces an intensely hot flame, used



Oxyacetylene Blowpipe. Diagrams illustrating the main features of A, the blowpipe, and B, gas cutting blowpipe

in oxyacetylene welding and gas cutting. The maximum flame temperature is about $3,130^\circ\text{C}$. The gases are mixed in the desired proportions either by mechanical control of the volume of the gases, supplied at equal pressures, or by dynamic control, using relatively high pressure oxygen blowing at high velocity to pick up low pressure acetylene. For most purposes the supply of oxygen is only 40 p.c. of that required for complete combustion, so that the inner part of the flame envelope is reducing in character. The main features are shown in the diagrams.

For welding, the blowpipe flame is used to heat and/or melt the metal joint faces to a suitable temperature for a metallic union to be made between them.

Oxychlorides. Metallic chlorides which also contain oxygen. They are formed when certain metallic chlorides are added to water, e.g. when bismuth chloride (BiCl_3) or antimony chloride (SbCl_3) is added to water, the oxychloride, BiOCl or SbOCl , is produced. Zinc chloride also forms an oxychloride on keeping, or on evaporating a solution of the salt. Some substances such as ferric chloride (FeCl_3), cupric chloride (CuCl_2), and bismuth chloride (BiCl_3), yield oxychlorides when heated in dry air. Magnesium oxychloride or Sorel cement is a strong binding agent.

Oxygen. Most widely distributed of the chemical elements, having the chemical symbol O, atomic number 8, atomic weight 16. It is a colourless, odourless, tasteless gas, and exists in the free state in the atmosphere, of which it forms about 21 p.c. by volume. Oxygen also occurs in enormous quantities in the combined state: eight-ninths, by weight, of water consists of oxygen, and oxides form a large part of the earth's crust. Oxygen is essential to life and combustion.

Oxygen was discovered in 1774 by Priestley, who called it "de-phlogisticated air," and simultaneously by Scheele (1742-86), a Swedish apothecary, who named it "empyreal" or "fire-air." Lavoisier, regarding it as the essential constituent of acids, gave it the name oxygène (acid-former).

The gas was first liquefied in 1877 by Caillaud and Pictet, and in liquid form is pale blue.

The methods of preparing oxygen are as follows:

(1) By heating mercuric oxide (HgO) or red oxide of mercury in a glass retort, Priestley's method.

(2) By strongly heating manganese dioxide (MnO_2) in an iron retort. One-third of its oxygen is given off, a lower manganese oxide (Mn_2O_3) being formed. Other compounds like lead dioxide (PbO_2), barium peroxide (BaO_2), and chromium trioxide (CrO_3), lose part of their oxygen when heated in the same way.

(3) When potassium chlorate (KClO_3) is heated it gives off its

oxygen, but in order to obtain the evolution of oxygen at a lower temperature it is mixed with one-eighth its weight of manganese dioxide. This is the method usually followed in the laboratory, and was employed for making large quantities of oxygen before the discovery of cheaper processes.

(4) When barium peroxide (BaO_2) is heated it gives off an atom of oxygen, and yields the lower oxide (BaO). This process has been used on a large scale for the preparation of oxygen, the advantage being its economical working. It is known as the Brin process, and was originally patented in 1880. The barium monoxide which is formed also has the property of absorbing oxygen when heated to a dull redness in the air. Hence, by alternately forming and decomposing the barium peroxide, the same quantity of barium salt can be used over and over again.

(5) The preparation of oxygen from liquid air depends upon the fact that the two chief constituent liquid gases, nitrogen and oxygen, evaporate at different temperatures, nitrogen being more volatile. Methods of separating them are worked on a large scale. Liquid air was first prepared by Sir James Dewar, and the apparatus for making it on a large scale was devised by Hampson.

(6) Other methods of preparing oxygen may be summarised. The peroxides or perborates of sodium or other alkalis give off oxygen when moistened with water, especially if they are previously mixed with a catalyst. This method is employed for producing oxygen under the name of "oxylith," and also in preparing tablets and salts used for oxygen baths. When a concentrated solution of bleaching powder to which a little cobalt oxide has been added is heated, oxygen is given off. Oxygen is also evolved from peroxide of hydrogen, especially when it is acidified with sulphuric acid and a solution of potassium permanganate is added gradually.

PRACTICAL USES. The main use of oxygen in the medical field is in connexion with oxygen therapy and anaesthetics. It also assists breathing, where necessary either at high altitudes or at great depths. For medical use it is supplied normally in small cylinders, but large hospitals may have a pipe line installed. Oxygen is applied in the industrial field for welding and cutting. In the former, the high temperature of the

flame when used with a fuel gas such as acetylene, coal-gas, hydrogen, or propane, allows of oxy-acetylene welding, brazing, flame cleaning, flame hardening, flame softening, and flame spinning. The oxygen cutting apparatus is described below. The element is supplied for industrial use either (a) in liquid form and by means of evaporators converted to gas and passed to points of use by pipelines; or (b) compressed in steel cylinders of various sizes.

Oxyhydrogen Flame. A type of flame produced by burning a mixture of oxygen and hydrogen gases in a blowpipe similar to that used for oxyacetylene (*q.v.*). The temperature of the flame is about $2,800^\circ \text{C}$. at its hottest point. The flame has a limited use for welding such materials as aluminium, when the proportion of hydrogen is considerably in excess of that required for perfect combustion, so that a reducing envelope is formed. The intense white light given off when such a flame is allowed to play on a cylinder of lime is known as a limelight or Drummond light.

Oxymoron (Gr. *oxus*, sharp; *moros*, foolish). Figure of speech, usually rhetorical, in which an effect is achieved by an apparent contradiction in terms. An example is in Francis Thompson's *Hound of Heaven*:

In faith to Him their fickleness to me;
Their traitorous truensness and their loyal deceit.

Oxyrhynchus. Ancient town near Behnesa, on the Bahr Yusuf, Upper Egypt. The Egyptian name was Permazet. The oxyrhynchus ("sharp-snouted") fish (*Mormyrus*) was venerated in the vicinity. In the 5th century the town had 12 churches, 10,000 monks, and 12,000 nuns. See *Agrapha*.

Oxytropis. Genus of perennial herbs and shrubs of the family Leguminosae. They are natives of Europe, Asia, and N. America. The leaves are divided into two rows of leaflets. The flowers are pea-like, purple, white, or pale yellow, grouped in spikes or sprays.

Oyama, IWAQ, PRINCE (1842-1916). Japanese soldier, born in Satsuma. He visited Europe during the Franco-Prussian War, and in the civil war of 1877 led a brigade of the imperial army. During the war with China, 1894-95, he commanded the 2nd army, whose exploits included the taking of Port Arthur and Wei-hai-wei. In the Russo-Japanese War, 1904-05, now marquess and field-marshal,

he was in chief command. His skilful conduct of operations, notably at the battles of Liao-Yang, Shaho, and Mukden, brought him the title of prince in 1907. The year before he had received the British order of merit. He died Dec. 12, 1916.

Oyapoc. River of S. America. It rises in the Tumac Humac Mts., and flows N.E. to the Atlantic Ocean, forming the frontier between Brazil and French Guiana. On its upper course are the Matouchi Falls, while rapids interfere with navigation. Its length is 280 m. Oyapoc village, 25 m. inland, trades in rubber, balata, and gold.

Oyer and Terminer. Anglo-French legal term meaning to hear and determine. In England courts of assize sit by virtue of the commission issued by the king to the persons therein named, one of whom, at least, is always a judge, to hear and determine all causes, and to deliver all gaols of the prisoners there awaiting trial for all treasons, felonies, and misdemeanours. Sometimes special commissions are issued, as when there have been serious riots.

Oykell. River of Scotland. It forms part of the boundary of Ross and Cromarty with Sutherland, rising in Loch Ailsh, and flowing E.S.E. into Dornoch Firth at Bonar Bridge. Its valley forms a highway through the hills of N. Scotland at its narrowest. Ben More rises N. of the source. Between Cassley Bridge and Oykell Bridge a battle was fought c. 1397 between Macleods of Assynt and Mackays of Sutherland. Montrose in 1650 escaped up the Oykell valley after his last battle at Corbisdale.

Oyster. Name generally applied to a wide variety of bivalve molluscs, but in a true zoological sense only to bivalves of the genus *Ostrea*. About 100 living and 500 fossil species from the Triassic age to the present day have been described. Probably some of these are varieties and not separate species; many descriptions relate only to the shape of the shell and not to the animal within.

Oysters are marine animals occurring in temperate, sub-tropical, and tropical regions in numerous localities throughout the world, frequently near the seashore in fairly shallow water. The flat or European oyster (*O. edulis*) occurs in suitable places on the Atlantic coast of Europe, including the British Isles. Its shell consists of two subcircular valves, of which the right is almost flat and the left saucer-shaped. They are

joined by a hinge ligament, at the slightly pointed part of the valve, and a single adductor muscle which pulls the valves together. The shell has an outer layer of conchyolin and two inner ones of calcareous material, the exterior presenting a rough and ridged appearance while the interior is of a pearly substance.

The young oyster becomes attached to a rock or other shell and in natural conditions remains so for most of its life. In order to obtain regular shells, cultivated oysters are freed from their attachment and grown on firm sea beds. But the attached mode of life has led to the loss of the muscular foot, typical of bivalves. The shell is lined by the bi-lobed mantle, enclosing the mantle cavity within which are the gills. By ciliary action these produce a current of water which passes into an inhalant chamber, through spaces in the gills, which so act as a sieve to food particles; then to an exhalant chamber, thence to the exterior. The food, almost entirely minute plant life, is transferred to the mouth by various ciliated tracts of the gills.

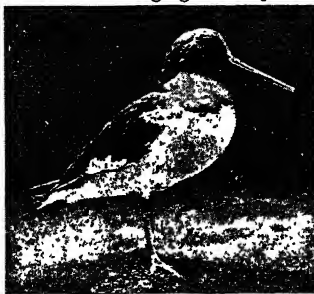
O. edulis may be male, female, or hermaphrodite. The sex usually changes several times during the life of one individual, that from female to male taking place in a few days just after spawning, its counterpart in the following spring. Spawning occurs in early summer; many eggs are extruded into the mantle cavity where they remain for about ten days. The larvae are originally white, but as their shell grows they become dark. The young are discharged into the sea as free-swimming individuals and are distributed by tidal currents over a wide area. They remain in this state for 10-14 days, then drop to the bottom to become permanently attached to a hard object by the left valve of the shell.

Three kinds of oysters are normally sold on the English market: the American (*O. virginica*) from N. America; the Portuguese (*O. angulata*) from the mouth of the Tagus; and the European (*O. edulis*) from France, Holland, and beds at Whitstable and Colchester in the U.K. The oyster pop. of Europe considerably declined during and after the Second Great War. Consult Oyster Biology and Oyster Culture, J. H. Orton, 1939.

Oyster Bay. Health resort and residential town of New York, U.S.A., in Nassau co. It stands on a picturesque, well-sheltered bay

on the N. coast of Long Island, and is served by the Long Island rly. and a line of steamers plying to New York city. Theodore Roosevelt lived on Sagamore Hill, overlooking the town. Pop. 5,000.

Oyster Catcher OR SEA PIE (*Haematopus ostralegus*). British shore bird belonging to the plover



Oyster Catcher. Specimen of this British shore bird
W. S. Berridge, F.Z.S.

tribe. The head and upper parts are black and the under parts white, while the long and straight beak is reddish orange. It is found about all the more rocky parts of the coast, and feeds upon molluscs, crustaceans, and marine worms.

Oystermouth. Watering-place of Glamorganshire, Wales, part of the borough of Swansea since 1920. It stands near Mumbles Head. 5 m. S.S.W. of Swansea, and is the terminus of a branch rly. Culture of oysters is an industry, although less extensive than formerly. There was a Roman station near, and a castle was built at Oystermouth soon after 1100. The site and ruins of the castle were given to the town by the duke of Beaufort in 1923.

Ozark Mts. (Fr. *Bois aux arcs*, wood for bows). Wooded plateau of the U.S.A. Lying between the Missouri and Arkansas rivers, it occupies a large portion of the states of Arkansas and Missouri, and penetrates into Oklahoma and Kansas, its average height being from 1,500 ft. to 2,000 ft. The Ouachita Mts., S. of the Arkansas, are an extension of the Ozarks.

Ozobrome Process. Method of making carbon prints, now virtually superseded by the Carbro process. Ozobrome prints were called ozotypes.

Ozoena OR ATROPHIC RHINITIS. Affection of the nose characterised by the formation of crusts which have an unmistakable penetrating odour. The patient is unaware of this, as his sense of smell is lost. The condition is difficult to treat.

Ozokerite. Naturally occurring hydrocarbon wax. It is

usually dark brown and often contains mineral matter and sometimes oil. It is associated with petroleum, and the most famous source is at Borzslaw in Poland, where it was mined on a large scale from 1870 to 1900, the output subsequently declining. Ozokerite is a residual product from seepages of waxy petroleum. When refined it is a white to yellow, hard, microcrystalline wax known as ceresin and used in polishes, electrical insulation compounds, etc.

Ozone (O_3). Gas with a peculiar odour somewhat resembling that of dilute chlorine. It was observed in 1785 that when an electric spark is passed through oxygen a distinct odour is apparent, but it was not until 1840 that the production of a definite gas—ozone—was proved. It is a form of oxygen containing three atoms in the molecule against two atoms in a molecule of ordinary oxygen. The gas readily changes into ordinary oxygen, but has distinct properties. Contrary to popular belief, the familiar smell of the seashore is not due to ozone, but to decaying marine vegetation. Ozone is produced on a large scale by the discharge from an electrical machine in oxygen or air. It is also formed by the action of cathode or ultra-violet rays on oxygen.

There is little ozone in the lower layers of the atmosphere, but it is comparatively plentiful at heights of 15-20 m. Information regarding the vertical distribution of ozone is provided by examining, at intervals throughout the day, the ultra-violet light coming down from the zenith sky and by the spectroscopic examination of sunlight. Ozone plays an important part in determining the thermal structure of the upper atmosphere, e.g. it is generally acknowledged that the high temps. of the region extending 25-40 m. above the sea are due largely to the absorption of solar radiation by ozone.

When ozone is strongly compressed an indigo-coloured liquid is obtained. Ozone is one of the most powerful oxidising agents known, and this property is utilised in a number of ways, e.g. for purification of air; for medicinal use in tuberculosis and whooping cough; sterilising drinking water; bleaching waxes, fats, fabrics, and yarns; "ageing" wood for musical instruments; oxidising or thickening oils; maturing wines and spirits; and sweetening foul beer casks.

IN the course of its history the name of this letter has changed much less than its form. The Phoenician alphabet (1000 B.C.) included a letter *𐤀* to fulfil much the same function as the modern letter *p*. The Phoenician name for it was *pē*, meaning mouth. Possibly it was based on an Egyptian hieroglyph resembling a shutter, which later was simplified to *𓆎*. The resemblance between a shutter and *𓆎* the position of the lips in pronouncing the *p* sound may have some connexion. The earliest Greek forms



turned the hook of the Phoenician *pē* either way *𐤁*, and the second of these developed *𐤁* into the classic Greek *pi*, *π*, with its familiar minuscule *π*. The *pi* is not to be confused with the Greek *rho* or *R*, which, though a direct derivative from earlier forms of that letter, closely resembled a modern *P* in shape (see *R*).

The extension of the hook of *pē* into the complete semi-circle which distinguishes the *P* of the Roman alphabet is first recognizable in the early Latin forms of about 800 B.C.

P Sixteenth letter of the English and Latin alphabets.

It is a voiceless labial or lip-sound. Its normal sound is that in *peck*, although in some words it is mute before another consonant, as in *psalm*, *ptarmigan*. *P* is intrusive between *m* and *t*, as in *empty*. The combination *ph* in words derived from the Greek is pronounced *f*, as in *philology*; in *apophthegm* and *phthisis* it is not heard. See Alphabet; Phonetics.

Paardeberg, BATTLE OF. Fought between the British and the Boers, Feb. 18, 1900. Cronje with a force of Boers was holding the entrenchments at Magersfontein, while French, with the main army of Lord Roberts behind him, marched to cut him off from Bloemfontein. This move forced Cronje from his camp, and, with 5,000 men and many women and children, he was soon marching by the side of the Modder to the Orange Free State. Near Paardeberg Hill the British came in touch with him, and while the cavalry and infantry were drawing nearer, the Boers entrenched themselves in the dry bed of the Modder. On Feb. 18 they were attacked from both sides, but when night fell the British infantry had lost heavily, and the Boer position was untaken. The attack was not renewed, but starvation did its work, and on Feb. 27, 4,000 Boers surrendered. The British, with 15,000 men in the field, lost 1,262 killed and wounded. See South African War.

Paarl. Largest inland town of Cape Province, S. Africa. It stands on the Berg river, 36 m. N.E. of Cape Town, with which it is connected by rly. In the surrounding district the vine and tobacco are grown; other industries are granite quarrying, fruit canning, and the building of wagons and carriages. The town, which extends for about seven m. along the river bank, was founded by the Dutch before 1700. The name means pearl. Pop. 26,485, of whom 10,860 are white. To the W. of the town is the Paarl Mt., on which are three gigantic boulders.

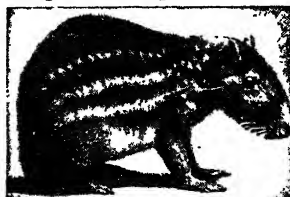
Pabna. District and town of East Bengal, Pakistan. Before the partition of 1947 it was in Rajshahi div. of Bengal. The dist. is in the corner between the Brahmaputra and the Padma distributary of the Ganges. Two-thirds of the area is cultivated, rice and jute being the chief crops. The town stands on the left bank of the Padma. Area of dist., 1,836 sq. m. Pop., dist., 1,705,072; town, 23,500.

Pabst, GEORG WILHELM. German film director. He was early connected with the theatre, turning to films in 1923. His pictures were distinguished by unusual lighting effects and camera angles during a period of photographic experiment in the European studios. His psychological presentation of character was at its best in *Kameradschaft*, 1931, and *The Secrets of the Soul*, directed jointly with Freud. Later films included *The White Hell of Pitz Palu*; *Don Quixote* (with Chaliapin and George Robey); *A Modern Hero*, 1934 (the first which he directed in the U.S.A.).



Georg W. Pabst, German film director

Paca or SPOTTED CAVY (*Caelogenys paca*). Rodent mammal. Related to the agouti, it is found in Central and S. America. Its fur is brown with rows of white spots along the sides of the body. It is about 2 ft. long, and in form suggests a rabbit without the characteristic ears or the long hind limbs. It lives in burrows, and does great damage to the crops.



Paca or Spotted Cavy, S. American rodent related to the agouti
W. S. Berridge, F.Z.S.

Pace (Fr. *pas*, from Lat. *passus*). Linear measure, representing the distance traversed by the foot from the place where it is taken up to where it is set down in walking. The Roman pace, measured from the heelmark of one foot to the mark where it next touched the ground, was equivalent to two modern paces and contained 5 Roman feet each of about 11.64 English ins. A thousand paces equalled one Roman mile.

The pace in the 20th century has been principally used as a measure for military marching. The British army pace, defined as the distance from the heel of one footstep to the heel of the next, is 30 ins. for quick time and 40 ins. for double-time marching. The U.S. army equivalents are 30 ins. and 36 ins.

Pace-Making. The term denotes setting the speed in certain athletic events. The pacer in running and cycling on tracks follows instructions to enable the principal for whom he acts to win a race or beat a record. Faster times are usually made when a pacer is employed, especially in cycling, where the pacer (often a motor-cyclist) acts incidentally as a wind-screen for the principal.

The word pacer is also applied to a horse whose method of progression is the pace, i.e. both off legs strike the ground in unison alternately with both near legs. Although the pace resembles the trot, there is a difference, the trotter covering ground by striking with off fore and near hind legs at the same time.

Pachacamac. Ruined city of Peru. It stands on the coast, about 20 m. from Lima. It was the sacred city of the Yuncas and had a temple, evidently a large and magnificent structure, of which some ruins remain. The temple was the centre of worship of the great creator-god Pachacamac, sacred even in Inca times. Other ruins are of later sacred buildings erected by the Incas. The city was plundered by Pizarro, and the site has been excavated by the university of Pennsylvania. The pre-Inca

creator-god Pachacamac was adopted as the Inca god of earth quakes.

Pachino. Coast town of Italy, in S.E. Sicily. It is situated in the prov. of Syracuse, 5 m. N.W. of Cape Passero and 13 m. by road S. of Noto, and was captured undamaged by Royal Marines during the Second Great War on July 10, 1943, the day of the Allied landings in Sicily.

Pachisi (Hind. *pachis*, twenty-five). Indian game for four players played on a board with counters and dice, of which a parlour equivalent exists in Great Britain under the name of Ludo.

Pachmann, VLADIMIR DE (1843-1933). A Russian pianist. Born at Odessa, July 27, 1848, he studied at Vienna conservatoire, and made his debut in Russia in 1869. On his first appearance in London in 1882, he displayed that complete mastery of technique which made him world-famous. As an interpreter of Chopin he was for long unsurpassed, his performances being marked by super-sensitive touch and delicacy of feeling. Later eccentricities, such as his refusal to perform except in Chopin's cloak and the pantomimic expression of his childlike enthu-



Vladimir de Pachmann, Russian pianist

siasms and aversions, did not deter music-lovers from enjoying his unique gift of interpretation. Died Jan. 7, 1933.

Pachmarhi. Hill station and sanatorium of the Deccan, India, in the Madhya union. Situated on the Mahadeo range, separating the Godavari from the Nerbada valley, it is 3,500 ft. above mean sea level, and is the seat of government of the Madhya union during the hot weather. Its name is sometimes applied to the Mahadeo range. Pop. 6,704.

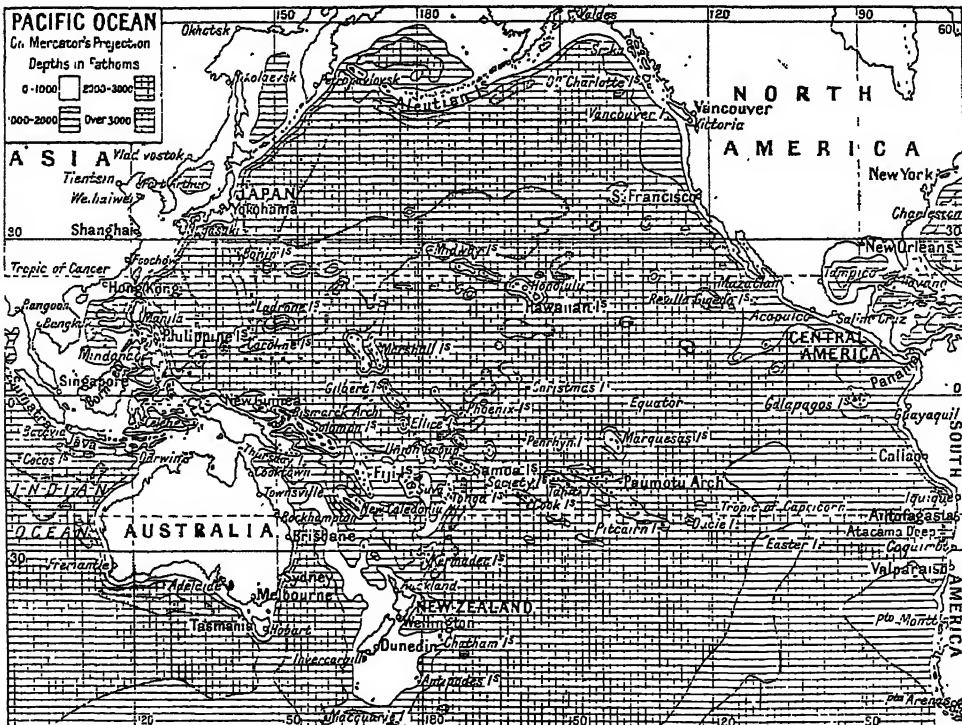
Pachuca. City of Mexico, capital of the state of Hidalgo. Known also as Hidalgo, it is situated among mts. at an alt. of 8,150 ft., 57 m. N.E. of Mexico City, to which there is a modern highway and a daily air service. It is in Mexico's greatest silver-mining district. Pop. 52,452.

Pachydermata (Gr. *pachys*, thick; *derma*, skin). Obsolete name given by Cuvier to those

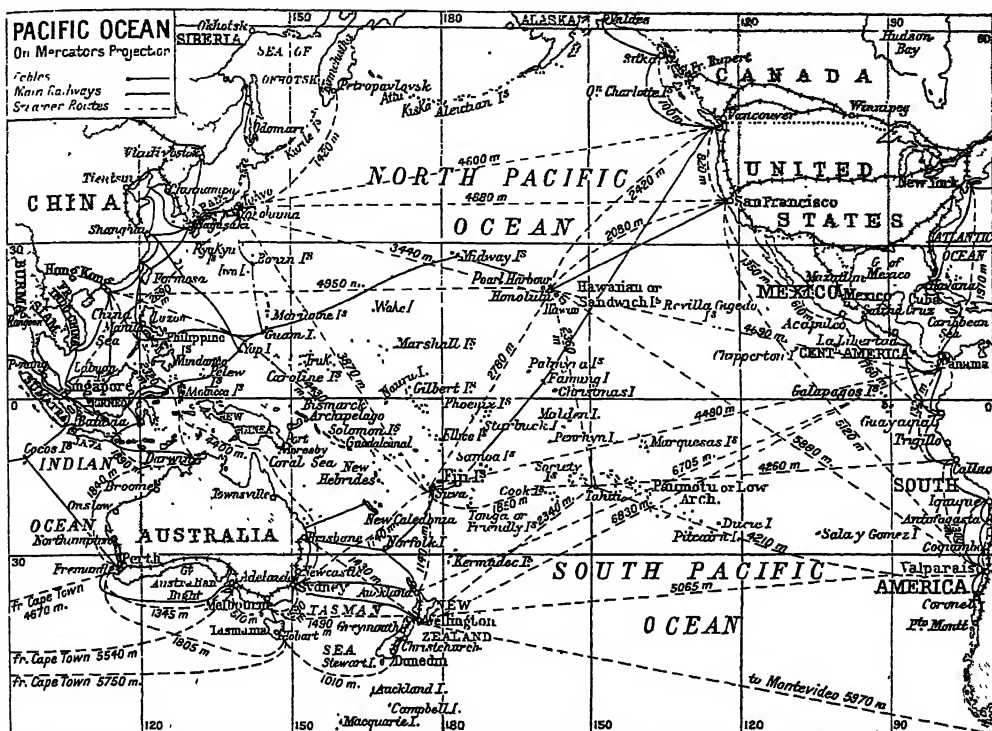
ungulate mammals having thick skins, such as the elephant and rhinoceros. See Ungulata.

Pacific Cable. There are two submarine telegraph cables in the Pacific. One, a British cable connecting Bamfield, Canada, via Fanning I. and Suva, Fiji, with Brisbane, Australia, and Auckland, N.Z., was laid in 1902 by the Pacific Cable board representing the govts. of the U.K., Canada, Australia, and N.Z. Its total length is more than 16,650 nautical m. The two cables, between Bamfield and Fanning I.—3,470 nautical m.—are the world's longest sections of submarine cable. Landlines across Canada connect the system with British trans-Atlantic cables; across Australia with the Indian ocean cable system. The system passed in 1929 to Imperial and International Communications Ltd., renamed Cable and Wireless Ltd. in 1934, which was taken over by the British govt. in 1947.

The other cable, between San Francisco and Japan, touches Hawaii, Midway I., Guam, Manila, Shanghai to Japan by the Bonin Is. A branch line runs from Guam to Yap, whence lines radiate to Japan and Indonesia.



Pacific Ocean. Map showing the varying depths of the ocean and the ridges on the ocean bed from which the majority of the South Sea islands rise



Pacific Ocean. Map showing the steamship routes and distances, and cables between Asia, Australasia, and America

Construction as far as Guam dates from 1903. The cable is owned by the Commercial Pacific Cable co. whose forerunners built up one of the Midway Is. out of an atoll. See Midway Islands.

Pacific Fleet. British fleet of the Second Great War. Based on Sydney, N.S.W., Australia, it included an Australian squadron. News of its formation was released Dec. 10, 1944, though the appearance of British warships in the Pacific had been announced from Tokyo in Nov. Its c-in-c. was Admiral Sir Bruce Fraser, and his flagship H.M.S. Howe; other major units were the battleships King George V and Duke of York, the aircraft carriers Formidable and Illustrious. See Pacific War.

Pacific Ocean. The largest of the five oceans of the world. It extends over an area of some 64,000,000 sq. m. In the N. it is linked with the Arctic ocean through the narrow Bering St. between Alaska and Siberia, while to the S. it merges widely with Antarctic waters. The W. boundary separating it from the Indian ocean is a line running from the Malay pen. through Sumatra, Java, Australia (Cape Londonderry), Tasmania, and then along

the meridian of 147° E. to Antarctica. Its E. boundary is the W. seaboard of N. and S. America and a line drawn from Cape Horn to the S. Shetland Is. in Antarctica.

It is the deepest of the oceans, with a mean depth of about 2,300 fathoms. The sea floor of the Pacific is characterised by two large submarine elevations or ridges, a W. Pacific ridge composed of several shorter ridges, often rising above sea level to form groups or chains of islands and traceable from Japan to Antarctica, and an E. Pacific ridge running from Central America to the S. and W. and reaching Antarctica in the long of New Zealand. These two ridges roughly divide the Pacific into a number of ocean basins. Particularly characteristic of the W. Pacific are deep depressions or trenches, most having a depth of more than 4,000 fathoms and occurring in regions which are centres of volcanic and seismic activity. Very great depths of water have been recorded in the W. Pacific, e.g. Nero deep off Guam I., 5,269 fathoms, a deep off Mindanao I., 5,348 fathoms, and a deep off Japan, 5,441 fathoms.

Within the tropical regions of the Pacific the great N. and S.

equatorial currents run E. following the line of the Equator; while the counter-equatorial current flows between them in the opposite direction. In the N.W. Pacific another warm current system, the Kuro Siwo, runs N.E. from Formosa, close to the Japanese coast, and then continues E. as the N. Pacific current. From the N. and S. the cold subarctic and subantarctic waters drift towards the equatorial region along the W. coasts of N. and S. America, the latter forming the Humboldt (or Peru oceanic) current.

Coral reefs and atolls abound in the shallower parts of the tropical Pacific wherever physical conditions, notably temp., favour their growth, e.g., the Great Barrier reef off Queensland.

Pacific Star. Campaign star awarded to personnel of the British armed forces who served in the Pacific ocean during the Second Great War. The bands of colour on the ribbon, from left to right, are; broad red, narrow dark blue, broad green, narrow yellow, broad green, narrow light blue, broad red. Entry into the operational zone was sufficient to qualify for the award. See Campaign Stars: Medal prtre.

THE PACIFIC WAR, 1941-45

Air Chief Marshal Sir Philip Joubert, K.C.B., D.S.O.

An account from Pearl Harbour, Dec. 7, 1941, to Japan's surrender, Aug. 14, 1945, of hostilities in the Pacific Ocean area. Fuller details of some of the actions will be found under particular areas—see e.g. Iwo Jima; Leyte; New Guinea; Okinawa; Philippines. See also Burma Campaign, 1941-45.

The Second Great War in the Pacific, which began on Dec. 7, 1941, with the attack by Japanese aircraft on the U.S. Hawaii naval base of Pearl Harbour, was in fact simply an extension of the campaign Japan was already waging against China, described in this work under China-Japan Conflict and Manchuria. Strategically the war situation in late 1941 looked most favourable to Japan's imperial ambitions. Great Britain was hard put to it to maintain her very existence owing to the intensity of the German submarine campaign; France was in German occupation; Russia appeared to be in extremis; and the U.S.A., not yet at war, was so weak in a military sense that the attack on Pearl Harbour put the U.S. fleet virtually out of commission for several months. Japanese occupation of Guam (Dec. 13), Wake I. (Dec. 23), and the Philippines followed rapidly, in spite of the gallant resistance of the U.S. garrisons, whose last stronghold in the Philippines, Corregidor, held out till May 6, 1942. On Dec. 8, 1941, the Japanese invaded Malaya; they sank H.M.S.S. Prince of Wales and Repulse on the 10th; Hong Kong fell to them on Christmas Day; by the end of Jan., 1942, they had seized Borneo, and had invaded Burma.

Japanese Reach the Solomons

On Feb. 14, 1942, Sumatra was attacked; on the 15th Singapore fell; and on the 19th Darwin, in N. Australia, suffered its first air attack. In Java, invaded on the 28th, the Dutch surrendered March 9. The British evacuated Rangoon on March 7, and the whole of Burma by May 15. The Japanese attacked the islands flanking Australia's N. coast in Jan., seizing Rabaul in New Britain and Kavieng in New Ireland (both in the Bismarck archipelago) on Jan. 23. On March 8 they landed at Lae and Salamaua in New Guinea; on March 10 they landed at Buka in the Solomons.

But the war at sea was not going too well for them, and to achieve their ends, control of sea communications was essential. The battle of the Coral Sea, May 4-9, forced the Japanese to call off an

intended seaborne attack on Port Moresby in S. New Guinea; and the abortive attack on Midway, June 3-6 (which cost the Japanese 20 of their invasion fleet of 80 for the loss of the U.S. aircraft carrier Yorktown and one destroyer) marked the end of Japanese seaborne attack on new objectives in the S. Pacific. But they had now begun an advance northward; they seized Attu, June 13, and Kiska, June 21, in the Aleutians. Weather, difficulties of supply, and an unexpectedly vigorous reaction by U.S. forces drove them to surrender on Attu on May 29, 1943, on Kiska Aug. 15. For the rest of the war the Japanese did not get nearer to the American mainland than their own Kurile Is., which suffered frequent attack from the air during the later stages of the war.

Australia Saved

Major naval operations against Port Moresby had become impossible, but that place was essential to the Japanese air force if it was to control the sea for an invasion of Australia. An attempt to take Port Moresby overland was held by the Australians, Sept. 15, only 32 m. from the town.

During the early summer of 1942 the Japanese had been busy constructing sea and air bases in New Guinea and the Solomons and bringing in troops; but while the Australians were still retreating in New Guinea, U.S. Marines on Aug. 7 began the first major Allied counter-offensive in the Pacific with landings on Tulagi, Guadalcanal, and other islands in the Solomons. The landings were a complete surprise, and initial resistance was weak; but during the night of the 8th-9th already Japanese naval forces engaged the Allied screening force off Savo I. and sank four heavy cruisers—the Australian Canberra and the U.S. ships Quincy, Vincennes, and Astoria; and although by Aug. 10 the U.S. forces were in effective control of the smaller islands, the fight for Guadalcanal was long and bitter.

By Jan. 23, 1943, the Australians had driven the Japanese out of Papua (British New Guinea), and by Feb. 10 Guadalcanal was free of the invader. It was not,

however, until June, 1944, that joint Australian and U.S. operations gave the Allies, despite isolated groups of Japanese in the interior, control of the whole of New Guinea. The capture of Biak I., May 27-June 20, 1944, in the Schouten Is. off N.W. New Guinea, marked an important point in the S.W. Pacific campaign, for it lies 860 m. from Darwin in Australia, and less than 800 m. from Mindanao in the Philippines. The capture of Morotai in the Moluccas followed, Sept. 14-17, 1944, the Japanese garrisons in the other Molucca Is. being bypassed. Further landings in the Solomons had secured New Georgia, Villa Lavella, and other islands during the summer; and from Nov., 1944, the Australians took over all operations in the S.W. Pacific, where fighting was to continue in Bougainville (Solomons), Borneo, and elsewhere until the surrender of Japan.

Central Pacific Operations

While the advance in the S.W. Pacific was progressing towards the Philippines, decisive operations were developing in the central Pacific. The British Ellice Is. were never attacked by the Japanese, and during the winter of 1942-43 were developed as an advance Allied base for the "island-hopping" campaign which was being planned. Landing craft of a type designed as a result of experience on Guadalcanal began to arrive in the Pacific. Carrier-based air attacks on the Japanese-occupied British Gilbert Is. began in Aug., 1943, and continued until on Nov. 20 landings were made on Makin I., conquered next day, and on Betio I. in Tarawa atoll, conquered only after a violent three-day battle; but by the 25th, U.S. forces were in control of the Gilberts.

By the end of Dec. four airfields, three suitable for heavy bombers, had been developed, and the scale of U.S. shore- and carrier-based air attack against the Marshall Is. (under Japanese mandate) to the N. was steadily mounting. The Japanese air forces there had been doubled in strength, but they were unable to prevent this development, although they lost many aircraft in their attempts to do so. On Jan. 29, 1944, after raids on 20 consecutive days, the attack on the Marshalls began: 700 aircraft flying from 12 carriers bombed Kwajalein, Roi, Maloelap, Taroa, and Wotja simultaneously. By the evening, of the estimated

130 Japanese aircraft in the Marshalls, not one remained operational. The undefended Majuro atoll was seized Jan. 31; by Feb. 22 control of the Marshalls had passed to the U.S.A.

The U.S.A. now held anchorages and bases over 2,000 m. W. of Hawaii from which amphibious expeditions could be prepared, land areas on which airfields capable of accommodating every type of aircraft could be made, and submarine bases 1,300 m. nearer the enemy's trade routes than Midway, the former anchorage. Under this threat the Japanese reorganized their naval forces. Their first mobile fleet was withdrawn to Singapore or to home waters, the c.-in.-c., Admiral Koga, remaining at Pelew with his flagship. The third fleet (the carrier force) reorganized into three divisions, one of which underwent training in the Singapore area, the other two in the Inland Sea, was reassembled at Tawi Tawi off N. Borneo in May.

Fast Allied carrier forces carried out a series of raids over a wide area. For example, on March 29-31, a U.S. task force operating against the Pelew (or W. Carolines—under Japanese mandate) and neighbouring islands destroyed some 150 enemy aircraft and sank 100,000 tons of naval and merchant ships, including eight tankers, besides damaging shore installations. U.S. losses totalled 25 aircraft; no U.S. ship involved received any damage.

The steady progress of the Allies in the central and S.W. Pacific gave assurance of protection from serious interference by the enemy, in the next Allied advance, against the Mariannes Is., which with the exception of Guam, a U.S. possession, had been mandated to Japan in 1919 and provided bases and airfields guarding communications between Japan and the Carolines, the Philippines, and other Japanese held territories. Landings in the Mariannes on June 15 were preceded by a heavy attack by sea and air forces. By Aug. 7 U.S. forces were in control of Saipan, Guam, and Tinian. Rota they bypassed. In Japan, the fall of Saipan on July 9 produced great alarm. The inner defensive line of the empire was now breached, and U.S. naval and air forces were bombarding and attacking the Bonin Is., part of the homeland itself. On July 18 Tojo, the prime minister, resigned, and a new govt.

was formed whose thoughts were turning towards peace. As yet, however, no open move to end the war was made.

The progress of the two-pronged Allied advance towards the Philippines—from the S.W. and from the central Pacific—had reached a point where the Carolines and Pelews were a dangerous salient between the two forces. Truk, the principal enemy base there, was under constant attack, but its reduction or neutralisation was the next move in the advance towards the Philippines and Japan itself. Attacks by land- and carrier-based aircraft on enemy aircraft and shipping from the Bonins to the Philippines produced weak enemy reaction on Mindanao. In the Visayan Is. in the central Philippines, over 600 aircraft and a number of merchant ships were destroyed. On Sept. 6 strong forces of carrier-based planes attacked the Pelew Is. preparatory to a landing on the 14th by U.S. Marines on Peleliu I. Babelthuap, largest of the Pelews, was bypassed; but by Oct. 1 U.S. forces were in possession of Peleliu and three other islands of the group and could dominate the whole of the Carolines. With the Mariannes, the Pelews, and the Moluccas under their control, the Americans were ready for their invasion of the Philippines.

Japan's Dwindling Resources

Japan's military strength was still considerable. Though she lacked air power, her army was numerous and her fleet strong. She could draw on Manchuria for army reinforcements. Her southern resources area was threatened; but essential supplies, including oil, were still reaching the homeland under cover of the Philippines, Formosa, and the inner island chain. Once she lost the Philippines, this slender thread of commerce would be snapped. If her fleet remained in the S. it would get oil, but no ammunition; if it based itself on the homeland ammunition would be available, but insufficient oil for prolonged operations. The Japanese naval staff decided on a gambler's throw in defence of the Philippines.

The U.S. campaign to recover the Philippines opened with concentrated attacks during Oct. by carrier-borne aircraft on targets in Mindanao and Luzon, the Ryukyu Is., and Formosa. On Oct. 14 and 15 China-based B.29 aircraft (Super-fortresses) also

struck at Formosa. The first attack on the Ryukyu on Oct. 9 was a complete surprise. Some thousand enemy aircraft were destroyed in these attacks for the loss of some 100 U.S. planes.

Allied Landing at Leyte

The air assault was switched to Leyte in the central Philippines 48 hrs. before a powerful U.S. force landed there on Oct. 20, instead of, as the Japanese had expected, on Mindanao, southernmost of the islands. The landing was the signal for the Japanese combined fleet, which had been avoiding action for two years, to challenge the Allied navies. The first diversion attack force, comprising the main battleship and cruiser strength, was ordered from Singapore to Brunei bay in Borneo, while the submarines were directed to Leyte. On the 18th, the second diversion attack force at Amami-o-Shima was ordered to the Pescadores off the W. of Formosa. The weakened carrier force, composed of four carriers partially equipped with aircraft, two carrier-battleships without any aircraft, three light cruisers, and ten destroyers, grandiloquently named the main body, sailed S. from the Inland Sea.

The first reports of Japanese naval movements came Oct. 21 and 22 from U.S. submarines cruising off Borneo, Palawan, and Luzon, which sank two and damaged another of the heavy cruisers of the first diversion attack force. This, sailing from Brunei towards the central Philippines, split into two, one part moving through the Sulu sea, the other through the Sibuyan sea. U.S. carrier air attack on both parts began on the 23rd; in the Sibuyan sea, damage caused compelled the enemy to retire to the westward. Meanwhile the Japanese shore-based aircraft attacked the U.S. carriers in strength, sinking the Princeton (10,000 tons). On the night of the 23rd-24th, the force from the Sulu sea attempted to pass through the Surigao straits; in the ensuing action U.S. surface forces sank two battleships and three destroyers; only one damaged cruiser and a destroyer escaped, the cruiser to be sunk by aircraft the next morning.

The second diversion attack force, which was following in support, delivered an abortive attack, in which the flagship and a cruiser suffered damage, and then withdrew. Meanwhile the U.S. carrier force, steaming N. at high speed, intercepted the main

body on Oct. 24, and sank all four carriers and two other ships without damage to one U.S. ship. The part of the first diversion attack force which had withdrawn westward under air attack advanced again and, despite its losses in the Sibuyan sea, passed through the San Bernardino strait (between Luzon and Samar). It then turned S. and off Samar encountered a group of U.S. escort carriers and destroyers. In the ensuing action most of the Japanese heavy ships were badly damaged, two cruisers were sunk, and a destroyer was left adrift. The Japanese retired to the Sibuyan sea, where they were again heavily attacked next day. During this phase of the battle Japan's newest battleship, the 42,000 ton *Musashi*, was sunk, as well as three destroyers. Three more cruisers which escaped were sunk later by attack from the air.

The most decisive sea battle of the Second Great War was over, and the Japanese fleet had virtually ceased to exist as a fighting force. The gambler's throw had failed. But the U.S. naval forces had taken a hammering during the battle and after by attacks from aircraft in charge of *kamikaze* (suicide) pilots.

The Leyte landing meanwhile was making slow progress against fanatical opposition; but by Dec. 25 organized resistance in the island ceased. In her attempts to reinforce Leyte, Japan lost 164,000 tons of shipping. On Dec. 15 U.S. troops made an almost unopposed landing on Mindoro I. at a point only 75 m. S. of Manila. Enemy resistance was quelled by the 29th. The Philippines had been virtually cut in two, and the U.S. forces were ready for their attack on Luzon. They landed in Lingayen gulf under MacArthur's personal command on Jan. 9, 1945; on Feb. 4 they reached Manila without fighting another battle. By the 6th the city was under U.S. control, except for the ancient walled city, Intramuros, across the Pasig river, where the Japanese fought suicidally until the 24th. Bataan was overrun and Corregidor seized on the 16th. The U.S. forces now dominated the Philippines once more (although isolated groups were still fighting in Mindanao and the Luzon mts. when Japan surrendered), and Japan was cut off from her short-lived empire in the S.

The hoped-for China-based air assault by B.29 aircraft had been greatly hampered by the Japanese

advance towards Yunnan in 1944 which deprived the U.S. air forces in China of seven valuable and well-developed airfields (*v.i.*). Moreover the difficulties of maintaining General Wedemeyer's striking force in China from E. Bengal had proved greater than had been anticipated. The Ledo road was not completed until Jan. 23, 1945; the oil pipe line from Calcutta was still being laid; and supplies carried by air across the mts. of N.E. Burma were inadequate.

British Fleet in Pacific

The build-up for the final Allied assault was, however, proceeding apace. A British Pacific fleet based on Australia was formed in Dec., 1944, to serve under the U.S. naval c.-in-c. or, where appropriate, Gen. MacArthur; and a British E. Indies squadron based on Colombo operated against positions in the Japanese-occupied Andamans and Netherlands E. Indies, while its submarines took toll of Japanese shipping in the Malacca strait. As the German naval threat diminished, British first-line war vessels and a vast train of merchant ships were transferred to Pacific waters, where the fleet took part in a number of attacks in support of the main drive towards Japan.

Iwo Jima was selected as the point for a landing in the Bonin Is. Japanese fighters operating from its airfields were intercepting B.29 bombers in passage from their base in the Marianas. Moreover possession of those airfields, which were within fighter range of the Japanese mainland, would mean that bombers raiding that mainland could be given fighter support, and could in emergency land at Iwo Jima on their return journey. The landing, made on Feb. 19, 1945, after a fierce three-day bombardment to which the enemy had scarcely replied, met much stiffer opposition than had been anticipated; but organized resistance ceased on March 16.

Ten days later U.S. forces landed on the Kerama Retto, a group of islets almost in the centre of the long chain of the Ryukyu Is., which lie between the Japanese mainland and Formosa, and are a part of Japan proper. Landings on Okinawa, key island of the group, began on April 1, after a tremendous preliminary bombardment. This was the largest amphibious operation attempted in the Pacific: 1,200 ships, 560 carrier-borne aircraft, and nearly half a million troops took part directly in the operation. The U.S. fast carrier force (80 ships and 900

aircraft), the British carrier force (20 ships and 250 aircraft), the 21st bomber command U.S.A.A.F., and the Far East air force acted in support.

Japanese naval reaction to the landings began in the evening of April 6 when a force described by Tokyo radio as a suicide force and composed of the 45,000 ton battleship *Yamato*, the light cruiser *Yahagi*, and eight destroyers—the poor remnant of the first diversion attack force—left the Inland sea to intercept the Okinawa landings. Next morning it was located by air reconnaissance, and at mid-day the U.S. fast carrier force attacked some 50 m. off Kyushu. At 14.23 the *Yamato* capsized and blew up; the cruiser and four destroyers were sunk. The remaining destroyers, after suffering damage, fled back to Sasebo; 380 U.S. aircraft took part in this attack, of which 10 were lost from A.A. gunfire. There had been no air opposition.

The battle for Okinawa proved the toughest in the Pacific. By his incredible fanaticism the Japanese soldier held out until June 21 against an invader who held absolute command of the air, had the equivalent of two armoured divs., an overwhelming strength in artillery plus the powerful guns of the combined Allied fleet, and an unlimited superiority in men, equipment, and supply.

Bombardment of Japan

After the fall of Okinawa, from sea and air the Allies showered blows on Japan itself. The first naval bombardment of the Japanese mainland came on July 14, when Kamaishi, port and industrial centre 275 m. N.E. of Tokyo, was shelled without response. Both before and during the bombardment some thousand carrier-borne aircraft ranged over a wide area of N. Honshu and Hokkaido, meeting no opposition. Next day Muroran was blasted from 1,000 yds. range. The heaviest naval bombardment of the war was carried out on the 17th by a combined U.S. and British fleet against a 70 m. stretch of the Honshu coast N. of Tokyo. Battleships approached within 24 m., cruisers and destroyers steamed close inshore. More than 2,000 tons of shells were poured into the industrial centres in the area. Bombardments by day and by night were frequent until a last one, on the Kuriles, on Aug. 13.

The first air attack on Japan was delivered on April 18, 1942, when Tokyo was bombed by air-

craft led by Col. Doolittle (*q.v.*) from the U.S. carrier Hornet. On June 15, 1944, came the first attack on Japan by land-based aircraft when B.29 bombers of the U.S. 20th A.A.F., flying from bases in China, bombed Yawata steelworks; it was followed by other raids on industrial and naval targets on July 7 and 29, Aug. 10 and 20, Oct. 25, Nov. 11 and 21, after which this U.S. air force had to retire to India owing to the Japanese advance in China. But by then a B.29 base had been established on Saipan in the Marianas, and on Nov. 24 Tokyo had its second raid of the war, the first of a series of mounting strength on both the capital and great industrial centres such as Yokohama, Nagoya, Osaka, and Kobe. Carrier-borne aircraft joined in the assault, on July 24 and 28, 1945, for instance, attacking two battleships, three carriers, and five cruisers and other vessels, all sunk or severely damaged. On July 27 B.29 aircraft dropped leaflets on eleven towns—centres of war production or transport—warning them that they would be targets for heavy air attacks; six were bombed the next day. By Aug. 5, 31 towns had been warned, and ten of them heavily bombed.

On Aug. 6 the first atomic bomb was dropped on Hiroshima (*q.v.*); on Aug. 9 the second on Nagasaki. Japan could no longer hold out. If the dropping of the atomic bombs did not bring about Japan's final downfall, they gave her rulers, in a situation so desperate that in all probability surrender could not in any case have been long delayed, a reason for accepting on Aug. 14 the full Allied terms of surrender.

Pacifism, or **PACIFICISM**. Attitude which rejects war, even to the extent of rejecting active or material resistance to aggression. It goes back to such medieval attempts at replacing warfare by international law as the *truga Dei*, and the plans for a union of nations made by King Podiebrad of Bohemia and Henry IV of France and his chancellor Sully. It is a fundamental of the Quaker and Mennonite religious systems and is based by these bodies on their reading of the N.T. The first peace society, founded in London, 1816, was soon followed by an American one. A French society was founded 1867 and a number of societies were formed in many parts of the world from then on. Victor Hugo (France), Cobden, W. T. Stead (U.K.), Bertha von Suttner (Aus-

tria), Alfred H. Fried (Germany) were among active advocates of peace. The creation of the Nobel peace prize, 1896; the world peace conferences, the first of which assembled in Paris, 1889, and established 1891 the international peace bureau in Berne (moved 1919 to Geneva); and Carnegie's peace endowment, 1910, fostered these movements.

While membership of peace societies was small, the indirect influence of pacifism has been considerable. During the First Great War the right of a man to object on grounds of conscience to participating in war was officially recognized in the U.K. The setting up of the League of Nations and of The Hague international courts seemed to mark the attainment of the aims of the pacifists. German generals, *e.g.* von Schönaich and von Deimling, and professors, *e.g.* F. W. Förster and L. Quidde, Victor Basch and d'Estournelles de Constant in France, La Fontaine in Belgium, and numerous R.C. leaders, *e.g.* Marc Sangnier, encouraged by papal encyclicals, proclaimed active pacifism.

The Geneva Protocol, 1924, the Kellogg Pact, 1928, and various disarmament conferences were attempts to establish a practical and international pacifism. In 1928 a war resisters' international was formed; and in 1936 an international peace campaign was organized to coordinate pacifism through the League of Nations.

Pacifism (as distinct from the common longing for peace) has been strongest in countries such as Great Britain and the U.S.A., where the general acceptance of a right to freedom of belief leads to the acceptance, even if reluctantly, of conscientious objection to military service as to other social usages. In dictatorships pacifism has been condemned and its supporters persecuted. *See* Conscientious Objector; International Law; Kellogg Pact; League of Nations; Peace Pledge Union, etc.

Packfong or **PAKTONG** (Chinese *pai-t'ung*, white copper). Alloy of nickel-silver type, used for many centuries by the Chinese for tableware and ornamental work. It was probably made by mixing the product of smelting nickeliferous copper ores with that of smelting zinc ores. Its composition was: nickel, 32–41 p.c.; copper, 28–40 p.c.; zinc, 16–37 p.c.; iron, 0–2.6 p.c.

Pack-horse. Horse employed in the carriage of goods. This method of transport is common

where the roads are not available for wheeled traffic, especially in mountain districts. In Great Britain pack-horses remained in use until the 18th century, especially for carrying wool.

Pactolus. Ancient brook in Lydia, famous for the gold found in its sands in classical times. It is believed to be the modern Sarabat (*q.v.*).

Padang. Town and seaport of Sumatra, Indonesia. Situated nearly in the middle of the W. coast, it is the terminus of a rly. line to the interior, and has considerable trade from the neighbouring highlands and islands. The harbour is 3 m. S. of Emmahaven, which supplies coal from the Ombilin coalfield. — Coffee, copra, tobacco, gum, and hides are exported. Pop. 51,976. Together with its harbour, it was the object of a number of attacks by British carrier-borne aircraft in 1944 and 1945 while Sumatra was in Japanese occupation.

Padaung. Township of Burma, in the Promé dist. The town is principally one long street along the right bank of the Irawadi on the road from Promé into Arakan. Pop. 57,500. *See* Burma.

Paddington. Met. bor. of the co. of London. Between Marylebone and Kensington, it is intersected by the Harrow Road and a branch of the Grand Union Canal. It includes the terminus of the old G.W.R., completed 1856, and the dists. of Maids



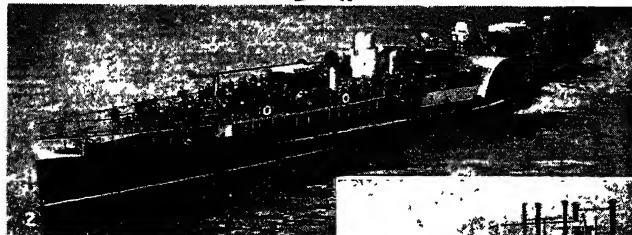
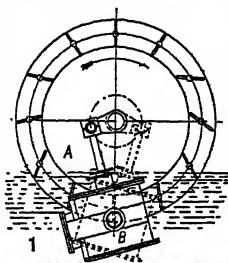
Paddington arms

Vale and Bayswater, with the busy shopping centre of Westbourne Grove, named after the Westbourne stream, which was used to form the Serpentine (*q.v.*). In addition to the town hall, enlarged in 1906, the bor. contains S. Mary's hospital, founded 1845; a lock hospital and mental hospital, workhouse and infirmary, municipal baths, and technical institute. In the churchyard of S. Mary's, Paddington Green—the parish church, 1788–1845, after which it was superseded by S. James's—are the graves of Sarah Siddons, Benjamin Haydon, and Joseph Nollekens. Westbourne Park Baptist chapel is associated with the work of Dr. Clifford.

The open spaces include a recreation ground of 27 acres, and the old cemetery of S. George's, Hanover Square, in which Sterne was buried and from which his

body is said to have been exhumed by body-snatchers. Notable residents of Paddington have included, in addition to Sarah Siddons, Robert Stephenson, Browning, the 1st Baron Coleridge, J. O. Hobbes, Herbert Spencer, and Sir Rowland Hill. The manor, anciently attached to Westminster Abbey, was given by Edward VI to the bishops of London, an episcopal connexion recalled by the names of several thoroughfares, e.g. Bishop's Bridge Road. Two members are returned to parliament. Pop. 127,450.

Paddle Steamer. Vessel driven by paddle wheels. The first steam vessels were propelled by paddles, which are still in wide use for river, channel, and lake steamers, particularly where the water is comparatively shallow. Two systems of paddles are known; in one the paddles or blades are rigidly attached to the framework of the

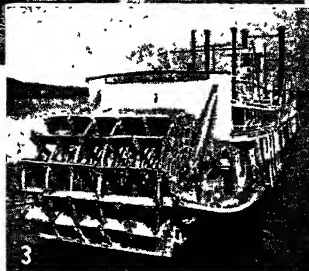


wheel; in the other the blades are free to turn through a certain angle and are operated by eccentric gear, as the wheel turns round, in such a way as to imitate in effect the feathering of an oar. They are known as feathering wheels. Special steamers have been built with a single, wide paddle wheel placed at the stern, for use in rivers where very shallow water occurs.

Paddy (Malay *padi*, rice). Rice in the husk. Paddy is the form used throughout the East, but in America it is known as *baddy*. Fields of growing rice, and very low-lying fields, are called paddy fields. The Java sparrow, which feeds on rice, is called the paddy bird, and a paddy pounder is a machine for husking rice. See Rice.

Paderborn. German town in N. Rhine-Westphalia. It stands at the source of the Pader, 50 m. by rly. S.W. of Hanover. One of the oldest German cities, it was a bishopric under Charlemagne, and

the seat of his diet in 777. Partly rebuilt after fire in 1875, it was devastated by bombs in the Second Great War. The cathedral, evolved upon Charlemagne's foundations in the 11th to 13th centuries, was not irreparably damaged, nor was the S. Bartholomew chapel of the same period; but the town hall (1416) and the Franciscan and Jesuit churches were lost. Paderborn is the seat of an archbishop, has a philosophical and theological academy, sanatoria connected with its alkaline spa, and cement, printing, and engineering industries. A Hanseatic town from 1295 and capital of an ecclesiastical principality, it passed in 1813 to Prussia. Armoured units of the U.S. 1st army overcame S.S. troops with tank support here in desperate fighting March 30–April 2, 1945, in the course of operations to isolate the Ruhr. Pop. (1939) 37,272.



Paddle Steamer. 1. Diagram of oscillating engine directly connected with crank, A, on paddle-wheel shaft, thus driving feathering wheel. Engine cylinder, B, oscillates on centre trunnion, as shown by dotted lines. 2. A pleasure paddle steamer. 3. Stern wheel steamer

Paderewski, IGNAZ JAN (1860–1941). Polish pianist and statesman. Son of a farmer, he was born at Kwrylowka, Russian Poland, Nov. 18 (6, o.s.), 1860. He showed exceptional musical gifts, and studied at the Warsaw conservatoire (where he became professor at 18) and with Leschetizky in Vienna. A teacher at Strasbourg, he did not appear as soloist until he was 27; he made

his début in Vienna, came to London in 1890, and next year achieved sensational European success. Romantic appearance as well as unfamiliar technique placed him in the front rank of pianists, and he made repeated tours of Europe and the U.S.A. His position as composer was established by an opera, *Manru*, 1901. Some of his other works were the popular minuet in G, symphony in B minor, songs, and pianoforte pieces.

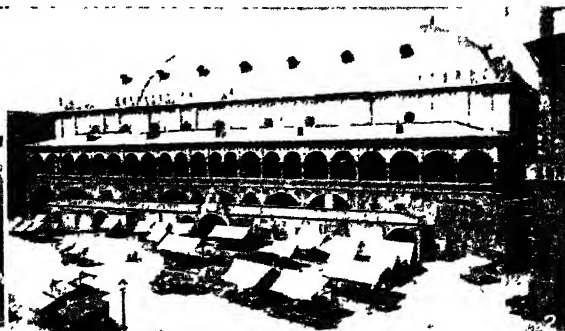
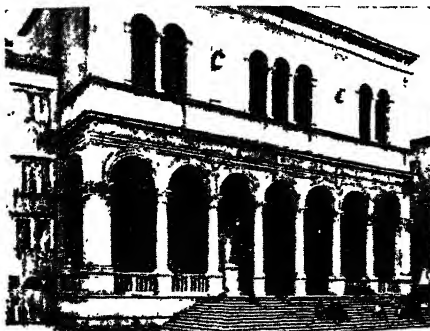
Arduently patriotic, he flung himself into charitable work on behalf of Polish victims of the First Great War. In 1916 he lectured on Polish history in the U.S.A., and when that country declared war he organized the training of Poles in Canada. He sought help in the U.K. in constituting the new Polish state, of which he was premier and foreign minister in 1919, signing the Versailles treaty. In opposition to Pilsudski, his government was defeated and, retiring from politics, he went to Switzerland and eventually California, and resumed his musical career. He reappeared to give recitals in England, 1925 and 1933, and in 1936 was in a film, *Moonlight Sonata*. When the Polish govt. was driven into exile in 1939, Paderewski, then living in the U.S.A., helped to raise funds and recruits for the Polish forces. He died June 29, 1941.

His art was a reflection of his highly emotional temperament, but brilliant technique placed it above the merely spectacular. As a politician he displayed energy and qualities of leadership just when they were demanded. He was knighted in 1925 for services to the British Legion, but did not use the title. There are lives by C. Phillips and R. Landau, both 1934; and the Paderewski Memoirs were edited by M. Lawton, 1939.

Padiham. Market town and urban dist. of Lancashire, England. It stands on the Calder, 3 m. N.W. of Burnley, with a rly. station. The chief building is S. Leonard's church, an old foundation rebuilt in the 19th century. The industries include the manufacture of cotton, while coal mines and stone quarries are worked in the neighbourhood. Market day, Fri. Pop. 10,000.



Ignaz Jan Paderewski,
Polish pianist



Padua, Italy. 1. Loggia del Consiglio, an early Renaissance building. 2. Sant' Antonio church and statue of Gattamelata. 3. Market place and Palazzo della Ragione.

Padilla, JUAN DE (c. 1490-1521). Spanish insurgent. Born at Toledo, he entered the army as a youth, and in 1518 placed himself at the head of a popular movement against the subsidy granted by the cortes to Charles V. With a considerable body of armed men he seized Joanna, the king's mother, and with his insurgent army marched to Valladolid, but despite various successes he was defeated at Villalar, made prisoner, and executed, April 23, 1521.

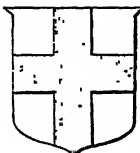
Padishah. Eastern title. It has been applied to the shah of Persia, the sultan of Turkey as ruler of the Ottoman Empire, the Great Mogul, by Indian natives to the sovereign of Great Britain as emperor of India, and by Orientals generally to European monarchs. The Persian *padshah* signifies lord king.

Padstow. Urban dist., town, and seaport of Cornwall, England. It stands on the N. coast, near the estuary of the Camel, 12 m. N.W. of Bodmin, with a rly. station. The church of S. Petrock is an old building, and S. Enodock's church has a Norman font. Padstow has a little shipping and fishing, and a trade in agricultural produce. It is also a pleasure resort. There was a monastery at Padstow, its foundation being ascribed to S. Petrock. The name is a corruption of Petrock's Stow. Market day, Sat. Pop. 1,929.

Padua (Ital. *Padova*). Prov. of Italy, in the N.E., in Venetia. It forms part of the Venetian plain and is crossed by the Adige, Brenta, and Bacchiglione. Wheat, rice, wine, and silk are produced.

Padua (Ital. *Padova*). City of Italy. It stands on several branches of the Bacchiglione, just above its confluence with the Brenta, 22 m. W. of Venice, for which it is the rly. junction. A

triangular walled city, it occupies a strategic position of the Venetian plain. In ancient days it was the chief town of Venetia, was the birthplace of Livy, and was sacked by Alaric and Attila. Nearly all the ancient monuments have disappeared. The university, founded in 1222, was a famous institution in the Middle Ages. Many streets are bordered by arcades; the Renaissance cathedral and the 13th century church of Sant' Antonio, before which



Padua arms

stands Donatello's equestrian statue of Gattamelata, the soldier of fortune, are notable. The Madonna dell' Arena contains frescoes by Giotto and Mantegna. Padua has some manufactures and a trade in agricultural produce.

All but two of the frescoes by Mantegna in the Eremitani church were lost when that building was destroyed by bombing from the air March 11, 1944. This was probably the greatest individual loss to Italian art during the Second Great War.

Paducah. City of Kentucky, U.S.A., the co. seat of McCracken co. A port of entry and headquarters for coal barge shipments on the Mississippi, it stands at the junction of the Tennessee and Ohio rivers, 170 m. S.E. of St. Louis, and is served by rlys. and river steamers. It is a leading tobacco and strawberry market. Pop. 33,765.

Paean. In ancient Greece, name for a hymn. Originally a hymn of supplication against plague, so called from Paean or Paeon, a god of healing, sometimes identified with Apollo, the



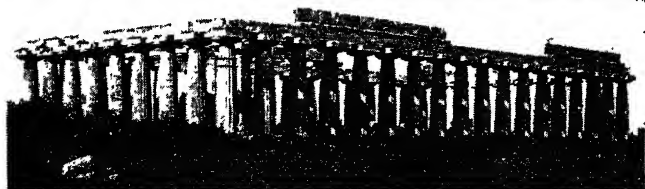
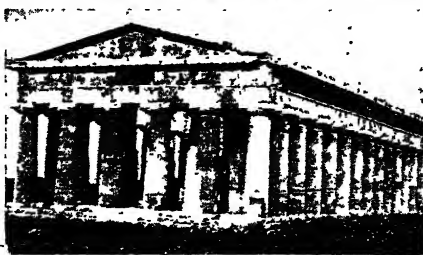
paean became a song of thanksgiving, used at festivals of Apollo.

Paeligni. Tribe occupying the Apennine uplands east of Lake Fucinus during the early Roman age. Their ethnic origin and primitive culture resembled those of the Marsi (*q.v.*), in whose war (91-89 B.C.) they shared, establishing in their fastness Corfinium, a short-lived republican capital. Another of their towns, Sulmo, was the birthplace of Ovid.

Paestum. Ancient city of Italy. It stands on the Gulf of Salerno, 24 m. by rly. S.S.E. of the city of Salerno. Founded by Greeks from Sybaris c. 600 B.C., and originally called Poseidonia, it became a Roman colony in 273 B.C. In the time of Augustus it was celebrated for its roses. Later of little importance, it became Christian, and in the 9th century was deserted by the inhabitants, after its destruction by the Saracens. Guiscard despoiled the deserted city of its monuments and sculptures. There are remains of three Greek Doric temples, which escaped damage in the Salerno battle of the Second Great War. These are the Temple of Neptune, 197 ft. long, 80 ft. wide; the so-called Basilica; and the Temple of Ceres. All three probably belong to the 6th century B.C. The city was surrounded by a wall partly preserved, and there are remains of a Roman amphitheatre and temple. When troops were digging a gun

emplacement during 1943 they found remains of a prehistoric cemetery. The area was wired in, and after the war further excavations were made by the Naples museum authorities.

Pagan. Term synonymous with heathen. In classical Latin *paganus*, i.e. inhabitants of *pagi* or villages, who might be employed for occasional military service, were con-



Paestum. Ruins of the ancient Greek colony in Southern Italy: top, Temple of Neptune, an example of 8th century B.C. architecture; below, the so-called Basilica, dating from the 6th century B.C.

trasted with *milites* or professional soldiers. When the Christians were described as soldiers of the faith, the indifferent masses were regarded as civilians or non-combatants. Hence the term pagan was applied to all non-Christians, except Jews and Mahomedans, who were at first considered an heretical sect. In the Middle Ages the term *Paynim*, through Old French from Lat. *paganismus*, was applied indifferently to heathen and Mahomedans, falsely thought to be idolators. See *Gentiles*.

Pagan. Township of Upper Burma, in Myingyan dist. It is situated on the left bank of the Irawadi, at the N. end of the Pegu Mts. Until the end of the 13th century Pagan was the capital and a fine city with numerous pagodas; it is now almost deserted, although a new township has grown up near by. Here on Feb. 14, 1945, British troops crossed the Irawadi and liberated Pagan intact.

Paganini, Nicolo (1784-1840). Italian violinist. Born at Genoa, Feb. 18, 1784, he made his first public appearance when nine years of age. The development of his unique gifts as a violinist was largely due to his own efforts. He left his home in 1798 and began a



Nicolo Paganini, Italian violinist

wandering career, gaining fame as a violinist of extraordinary powers. In 1828 he extended his tours beyond Italy, visiting Vienna, Berlin, Paris, and England.

In 1833 he returned to Paris. He died at Nice, May 27, 1840.

His weird appearance, dissolute youth, powers as an executant, and methods of bewildering musicians reveal him not only as a genius, but also as something of a charlatan, and this combination of qualities has given rise to many extravagant stories about him. He composed pieces for the violin, including some caprices which have been arranged for the piano by both Schumann and Liszt. Brahms wrote variations for piano and Rachmaninov a rhapsody for piano and orchestra on a theme of Paganini. *Consult* Life, J. Pulver, 1936; The Condemnation of P., A. Vinogradou, 1946.

Page. In feudal times, a youth of gentle birth in training for esquireship and knighthood, who acted as assistant to an esquire in attendance on a knight and his lady. Pages were trained in arms, armory (or heraldry), and the amenities of life, including the chase, music, and dancing, also receiving such instruction in the Humanities as was deemed necessary for persons of gentle birth. The order survives in the pages of honour attached to European courts, youths who are trained at the expense of the sovereign, are allotted certain duties, and are usually given commissions in the household regiments or sovereign's bodyguard. In the U.K. the sovereign has his pages-in-waiting. In hotels and large private houses young male attendants called pages are employed on light duties. In the U.S. senate and house of representatives the attendants are known as pages. See *Feudalism*.

Page, Sir Earle CHRISTMAS GRAFTON (b. 1880). Australian statesman. Born in Grafton, New South Wales, Aug. 8, 1880, he studied at Sydney high school and university, and became a surgeon. During the First Great War he served in France and Egypt. He was elected to the Australian

parliament in 1919, and was Commonwealth treasurer, 1923-29; minister of Commerce and deputy prime minister, 1934-39; and minister of Health, 1937-38. Leader of the Country party, he was on four occasions acting prime minister. On the sudden death of J. A. Lyons, April 7, 1939, he became prime minister, but a fortnight later resigned in favour of R. G. Menzies. In Sept., 1939, he resigned the leadership of his party, being opposed to cooperation with the United Australia party in a national government under Menzies's premiership; but he joined the national government, Oct. 27, 1940, as minister of Commerce. In 1941-42 he was special Australian envoy to the British war cabinet, and in 1942-43 a member of the Australian war cabinet. He was minister of health in the coalition govt. of 1949. A privy councillor in 1929, he was created G.C.M.G. in 1938 and C.H. in 1942.



Sir Earle Page, Australian statesman

Page, Sir Frederick Handley (b. 1885). British aeroplane designer. Born at Cheltenham, he was trained as an electrical engineer, and in 1906 began experimenting in aeronautics. He built a number of gliders to test his theories, and in June, 1909, established the first aircraft factory in the U.K., the same year producing his first aeroplane, the monoplane Bluebird. In 1912 he opened a factory at Cricklewood. In 1915 he put into production the first twin-engine bomber, since when his firm has specialised in the heavy multi-engine aircraft. After the First Great War he turned to civil aviation and designed a 20-seater aeroplane with which he inaugurated the London-Paris service in May, 1919. With the merging of Handley Page Transport into Imperial Airways in 1924, Page

began the design of multi-engined aircraft for the Imperial routes.

In 1927 Page greatly advanced aircraft safety and manoeuvrability by inventing the slotting wing, now standard on most aircraft. His contributions to aerodynamical design and efficiency placed him in the front rank of aeronautical science. During the Second Great War, when his company owned an experimental aerodrome at Radlett, Herts, there were produced large numbers of heavy bombers including the Hampden, Hereford, and Halifax, over 6,000 of the last-named being used by the R.A.F. Vice-chairman of the air registration board since 1937, Sir F. H. Page was president of the Royal Aeronautical Society, 1945-47. He was knighted 1942. See *Aeroplane*.

Page, WALTER HINES (1855-1918). American editor and diplomatist. Born at Cary, N. Carolina, Aug. 15, 1855, he was educated at Randolph-Mason College, Va., and at Johns Hopkins university. After seven years in control of *The Forum*, he became in 1898 editor of the *Atlantic Monthly*, and in 1900 founded *The World's Work*, issued by the publishing firm of Doubleday, Page and Co., in which he was a partner. He edited it until 1913, when he was appointed ambassador to Great Britain. During the period of American neutrality in the First Great War his enthusiasm for the Allied cause brought him into frequent conflict with President Wilson, but he remained at his post until Aug., 1918, when failing health compelled his retirement. He died at Pinehurst, N. Carolina, Dec. 21, 1918.

Pageant. A word originally meaning the stand on which mysteries and other dramatic performances were given. Gradually it was extended to the performance, and has been used to describe an unusual display, especially one in which a sequence of many scenes or episodes on a large spectacular scale treat a single broad theme, with a final tableau and grand march past. Open-air pageants of local history, presented lavishly with enormous casts, were a fashionable summer entertainment in the ten years immediately preceding the First Great War.

Paget. Famous English family. Its first prominent member was William Paget, an official of the city of London, who lived about 1500. His eldest son, William Paget (1503-63), served Henry VIII in various ways, becoming a secretary

of state. He was also a high official under Edward VI and Mary, and having been created, in 1549, Baron Paget of Beaudesert, died June 9, 1563.

The title passed in turn to Paget's sons, Henry and Thomas, and then to other descendants. Henry, the 7th baron, was made earl of Uxbridge in 1714, but this title became extinct in 1769, when the main line of the family failed. It was restored in 1784 for Henry Paget, who had inherited the estates and the barony, while his son Henry, the 2nd earl, was made marquess of Anglesey in 1815 in recognition of his services at Waterloo. Many other members of the family were famous either as soldiers or as sailors.

Paget, SIR BERNARD CHARLES TOLVER (b. 1888). British soldier. Paget was born on Sept. 15, 1888, and educated at Shrewsbury and Sandhurst. He served in the First Great War and was commandant of the Staff College, Camberley, 1938-39. In April,



1940, Paget was in Norway, commanding the British land forces in the Trondhjem-Aandalsnes area. He was appointed c.-in.-c., South-Eastern Command, in 1941 and became c.-in.-c., home forces, in the following year. Paget was responsible for the training of home defence troops, and those going overseas before 1944 as well as the greater part of 21st army group, introducing realistic methods of training and founding the system of battle schools. In Dec., 1943, he was made c.-in.-c., Middle East, retaining this appointment until his retirement in 1946. He was principal of Ashridge College, 1946-49. Created a K.C.B. in 1942.

Paget, SIR JAMES (1814-99). British surgeon and pathologist. Born at Yarmouth, Jan. 11, 1814, he studied at St. Bartholomew's hospital, London, and became demonstrator in the hospital in 1839. His lectures, 1847-52, as professor of anatomy at the College of Surgeons, after-



Sir James Paget,
British surgeon
After Millais

wards published in book form, became a standard text-book. In 1871 he was made a baronet, and in 1875 pres. of the Royal College of Surgeons. He died Dec. 30, 1899.

Pagliacci, I. Opera in 2 acts by Leoncavallo. The libretto (by the composer) is reputed to have been founded on an actual incident. First produced at the Teatro del Verme, Milan, May 21, 1892, 1 *Pagliacci* was presented at Covent Garden the following year. The opera was first performed in English by the Rouseby company at Leicester in 1893. It is known in Germany as *Bajazzi*, and in France as *Paillasses*.

Pagoda. Term in European use denoting a tower-like structure in India and E. Asia. A 16th century Portuguese corruption either of *dagoba*, a stupa or tope, or of Pers. *but-kadah*, an idol-temple, it designates in India temples with pyramidal towers. In Burma it denotes the Buddhist *paya* or *sedī*, a bell-shaped structure with conical finial, often gilded. The most venerated are at Rangoon, Mandalay, Prome, and Pegu. The Siamese *phra* is bell-shaped, with slender annulet spire, as at Phra Pathom, Ayuthia, or pyramidal, with domed cylindrical turret, as at the Wat-ching in Bangkok. The Japanese square timber-built *gojunoto* retains the Korean form, with an odd number of roofs.



Pagoda. This 16th cent. pagoda at Soochow, China is 250 ft. high

China perhaps derived its earliest towers, as at Sian-fu, the oldest extant, from the Babylonian square seven-storied *ziggurat*. The later Chinese *taa* became octagonal, with an odd number of storeys; for instance three in the Temple of Heaven at Peiping; seven at Ningpo; nine in the Porcelain Tower at Nanking, which was destroyed in 1854. The Kew Pagoda, 10-storied, erected 1761, follows the Chinese pattern.

Pagoda Tree (*Sophora japonica*). Tree of the family Leguminosae. It is a native of China and Japan. The long bluish-green

leaves are divided into about a dozen oval leaflets, and the small cream-coloured flowers are lavishly produced in large clusters. The Chinese obtain from the flowers a fine yellow dye, used for dyeing the silk robes of the mandarins.

Pago Pago. Natural harbour on the S. coast of Tutuila, one of the Samoan Islands. Called also Pango Pango, it belongs to the U.S.A., which has used it as a naval station since 1839. Its right to do so was established by treaty in 1872, and later was allowed to lapse, but in 1889 the right of the U.S.A. to the island of Tutuila was recognized by the Berlin General Act. The town is the seat of administration for American Samoa, where an American naval radio station is maintained. The harbour is the crater of an extinct volcano.

Pahang. State of the Federation of Malaya. It has a long coast on the S. China Sea, lies between Johore on the S. and Kelantan and Trengganu on the N., and is separated from them by high mts. It consists almost entirely of the basin of the Pahang.

Pahang was an independent Malay state until 1888, when it came under British suzerainty; and joined the Federated Malay States in 1895. It is sparsely populated. Pekan at the mouth of the Pahang is the seat of the sultan; Kuantan, farther N., is connected by road with Kuala Lipis. The state is traversed by the rly. from Gemus to Tumpat on the N.E. coast of Kelantan. Its area is 13,820 sq. m. Pop. 221,800.

Pahlavi or **PEHLEVI** (Pers. *Pahlav*, Parthian). Name of a cursive script of Aramaic origin used in writing Persian during the Sassanian period. The name is also often used for the Persian language of the same period, otherwise called Middle Persian.

Pahlevi. Family name of the rulers of Persia. See Mohammed Riza Shah Pahlevi; Riza Shah Pahlevi.

Paiforce. Allied force formed in Persia and Iraq, Aug., 1942. It comprised the British 10th army (only a small group), a large Polish army formed from prisoners taken by the Russians in 1939 and later released, and the Iraqi army. Its main task was to safeguard the Persian oilfields. Paiforce (the name was derived from the initials of Persia And Iraq command) saw no fighting, but under exacting conditions undertook heavy constructional duties and was responsible for the despatch to Russia through the Anglo-American sup-

ply lines of more than 4,000,000 tons of material.

Paignton. Urban district and watering place of S. Devon, England. It stands on Torbay, 3 miles from Torquay, with a station on the British rlys. W. region. The chief building is the Perpendicular church of S. John. The Bible Tower is part of the old palace of the bishops of Exeter. It is so called because here Miles Coverdale prepared his translation of the Bible. The attractions include spacious sands and zoological gardens. Pop. 26,000.

Pain (Lat. *poena*, punishment). State of distress, bodily, mental, or both. Physical pain may usually be regarded as a danger signal, showing that some physical condition is wrong, though not necessarily in the place in which the pain is felt. The severest forms of mental pain are grief, shame, and acute anxiety. When they are connected with deep moral fears they can be so intolerable that the mind gets rid of them by repression (*q.v.*).

All healthy beings strive to avoid mental pain, since it invariably gives rise to resentment even when this is not consciously felt. This resentment may change into bitterness or hostility.

The self-infliction of pain, sometimes to the point of torture, is a widespread habit in human beings, and under the name of asceticism has played an important part in human history. Biologically and psychologically, pain is an evil, though when associated with great effort, laborious toil, deep sympathy, etc., the results may on the whole be good. See Pleasure.

Pain, BARRY ERIC ODELL (1864-1928). British author. Born Oct. 22, 1864, and educated at Sedbergh School and Corpus Christi College, Cambridge, he turned early to literary work, and became known as a writer of humorous stories, sketches, and parodies. In a Canadian Canoe appeared in 1891, and among his many subsequent works the Eliza sketches were outstanding (Eliza, 1900; Eliza Getting On, 1911; Exit Eliza, 1912). Also popular were The One Before, 1902; and Stories in Grey, 1912. He died May 5, 1928.

Paine, THOMAS (1737-1809). British publicist and politician. Born at Thetford, Norfolk, Jan. 29, 1737, son of a small farmer and staymaker, he tried various occupations, including that of excise-man. Dismissed in 1774, he met

Franklin in London the same year, and, apparently under his advice, emigrated to America. Settling in

Philadelphia, Paine issued in 1776 a pamphlet entitled *Common Sense*, putting the case for independence, which, according to Washington, had great influence on the colonists. He fought in the U.S. army, and received a government appointment, which he lost.

In 1787 Paine returned to England and issued *The Rights of Man* as a counterblast to Burke's *Reflections on the French Revolution*. The work made a great sensation and Paine was indicted in 1792, but escaped to France, where he had an enthusiastic reception. Subsequently he fell foul of Robespierre, was imprisoned and narrowly escaped the guillotine, but was released in 1794 on claiming American citizenship. The first part of *The Age of Reason* had been finished just before his arrest; the second followed in 1795. The book was an attack upon revealed religion from the point of view of the 18th century deists, accompanied by all the vigour and occasional brutality which characterised Paine's writings. He died in New York, June 8, 1809. The standard biography is by M. D. Conway, 1892.

Painlevé, PAUL (1863-1933). French statesman. Born in Paris, Dec. 5, 1863, and educated at the École Normale Supérieure, he became professor at Lille and later at the Sorbonne, being well known as a mathematician, scientist, and philosopher. Appointed professor of mechanics and engineering at the École Polytechnique, 1904, he became interested in aviation. Painlevé entered the chamber of deputies as a Socialist in 1906, and was soon chairman of the navy committee. He concentrated the fleet in the Mediterranean, thus necessitating an understanding with Great Britain. Early in the First Great War he held administrative posts, and in 1915 became minister of public instruction.



Thomas Paine,
British author
After Romney



Paul Painlevé,
French politician

Resigning on a disagreement with Briand, he soon became minister of war under Ribot, and was responsible for the replacement of Nivelle by Pétain and for steps aimed at raising the morale of the rank and file. He succeeded Ribot as premier in Sept., 1917, but was forced to resign two months later.

In 1924 he was elected president of the chamber of deputies, but was defeated for the presidency by Doumergue. On Herriot's fall in 1925 he again became premier, but was criticised for half-hearted measures to save the franc and for his choice of the pacifist Caillaux as finance minister, so that his government fell. He was minister of war under Briand, 1926, and under Poincaré, 1926-29; and minister for air in 1932. He died Oct. 29, 1933. *A Life*, by E. Charles, appeared in 1925.

Paint. Pigment ground to a smooth paste in a medium which after application to the surface sets to a hard more or less elastic film. Such films are applied for both decorative and protective purposes and have been used from the earliest times. They may nowadays be classified as oil paints, water paints, emulsion paints, and bituminous paints. Preparations in which the medium is a solid (e.g. nitrocellulose) dissolved in a suitable solvent are described as lacquers (*q.v.*).

OIL PAINTS. This is the largest class. Unless otherwise specified, it is generally assumed that an oil paint is intended. Such paints contain (1) an oily medium, which may contain resinous substances to increase the gloss and hardness of the film; (2) driers, which accelerate the drying of the film; (3) volatile solvent (thinners), which reduce the paint to working consistency; (4) pigments, which give the necessary opacity and colour to the film; (5) extenders, which, although of little or no tinctorial value, contribute to the consistency of the paint and to the physical properties of the film.

The basis of oil media is usually linseed oil. Since about 1920, china wood oil has sometimes been used in conjunction with linseed. Properly refined linseed oil, when spread in a thin film, dries in 8 to 9 days. By the addition of small amounts of lead, manganese, or cobalt compounds, the drying time can be reduced to 8 hours under normal atmospheric conditions. When heated, linseed oil gradually thickens, eventually forming a tough leathery mass, and it is therefore possible to produce

an oil (stand oil) of any desired consistency. Stand oils dry slower than untreated linseed oil, but the films are more durable and glossy.

The volatile thinners determine the consistency of the paint. Turpentine, particularly American, was once considered the only really satisfactory thinner, but though its merits are still recognised, white spirit (a petroleum distillate) is much used. This was first introduced in 1885 as "Patent Turpentine," and it is now recognised as a paint ingredient, not merely a substitute for turpentine.

The use of pure colours of great tinctorial strength renders it both possible and necessary to use considerable quantities of substances which, though of little pigmentary value, act as bases for the expensive pure colour and contribute to the properties of the paint. Thus substances such as china clay and asbestine, being light and bulky, reduce the tendency of heavy pigments such as white lead to settle out, and of reactive pigments such as zinc white to form hard deposits, in ready mixed paint. Barytes, on the other hand, is a heavy substance, and being hard and crystalline adds bulk to the paint and increases the solid content and hardness of the film. In undercoats it gives a "tooth" to the film which improves the adhesion of subsequent coats. Few paints consist wholly of one pigment.

GLOSS PAINTS AND ENAMEL PAINTS. There is no definite line of demarcation between these. Enamel paints are the highest class and the medium consists largely of a varnish containing resins. The medium of gloss paint varies from linseed oil with a proportion of stand oil to a high proportion of thickened oils and including more or less resin. In both classes natural or synthetic resins may be used.

WATER PAINTS. The simplest type of water paint is a mixture of whitening with size solution. More satisfactory results are obtained by using good quality glue and pigments carefully selected to give the best results. Such paint eventually becomes practically insoluble in cold water, but still remains soluble in hot water. A water resistant paint can be made from casein. (*See Distemper.*)

EMULSION PAINTS. In these the medium may be described as an emulsion of a water and an oil medium, though a suitable substance is usually added to ensure stability of the emulsion. They are

largely used for decorative purposes, especially where a flat (*i.e.* dull) finish is desired.

BITUMINOUS PAINTS. These may consist almost wholly of bituminous substances dissolved in volatile solvent or be complex mixtures of the varnish type in which the bitumen wholly or partly replaces the resin. As with the ordinary oil varnishes, the properties of the product are much influenced by the methods of manufacture. Paints in which the medium consists essentially of bitumens in volatile solvent are rapid drying and are much used for metalwork, particularly where stove drying is possible. Paints in which oil is present in quantity are generally slower drying but give thicker and more durable film. Such paints are much used for protective paints on ironwork. Naturally the colour range is limited by the colour of the medium. Bituminous paints are largely used as ships' paints. *See Colour Mixing; Painting and Decorating; Pigments; Varnish.*

Painted Lady (*Vanessa cardui*). A butterfly of the family Nymphalidae and of nearly world-wide range. It is unable to survive the winter in Great Britain and its occurrence is due to migrants from N. Africa which produce a autumn generation of British-born individuals. In some years it is exceedingly abundant, in others scarce or absent. The caterpillar has short branched spines and lives on thistles and other plants, whose leaves it draws together with silk to form a shelter. *See Butterfly colour plate.*

Painters' or Painter-Stainers' Company, THE. London city livery company. In the 15th century a guild of S. Luke, it was granted charters in 1581 and 1685, and its minute books go back to 1623. Its freemen include Sir Peter Lely, Sir Godfrey



Kneller, and Sir Joshua Reynolds. The original hall, at 9, Little Trinity Lane, E.C., bequeathed to the company by Sir John Browne, serjeant painter to Henry VIII, was rebuilt in 1668, and enlarged in 1880 and 1916. The doorway is attributed to Grinling Gibbons. The old portion of the building was destroyed by German bombs in 1941. *Consult The History of the Painter-Stainers' Company*, W. A. D. Englefield, 1923.

PAINTING: THE ART OF THE PICTURE

* GORDON STOWELL, A.R.C.A. (Lond.)

This article deals with pictorial art. The craft of what is generally known as Painting and Decorating is treated separately under that heading. An historical account of the development of the artist's technical methods is here followed by a general survey of the great schools of painting, and a particular account of British painting from the 17th to the 19th centuries, then by a special section on Painting in the 20th Century. See also Art; Drawing; Landscape, etc.; under the heading Art in the entries on France, Germany, Italy, Spain, etc.; Dutch School; Flemish School; and entries on the world's great painters

The pigments of the artist's palette are essentially the same animal, vegetable, and mineral substances as those used in other forms of painting (see Pigments). They are applied to a surface usually but not invariably by brush, after mixture with a medium, e.g. water, linseed oil, egg tempera. For oil media the brushes most used are of hog-bristle; for water media, the more pliable sable. Until comparatively recent times it was the artist's practice to grind and mix his own pigments in the studio according to his needs, but artists' colours are now specially prepared by manufacturers, ready mixed to a stiff paste, with linseed oil or poppy-seed oil, and packed in metal-foil tubes. Those intended for water-colour work are still sometimes sold in small hard flat cakes, prepared with size or gum arabic, but are more usually softened with glycerine and sold in tubes or in china pans and half-pans. The artist using an oil medium will still choose to dilute or re-mix the pigments on his palette, sometimes with turpentine, according to his immediate needs. If he is using an oil medium, the surface on which he paints, canvas or wood, needs to be primed with a coating of size, usually mixed with white lead. Canvases are today usually obtainable already primed and stretched on a frame to give a flat surface. Water-colour paper is also usually stretched to prevent "cockling" by saturation during the process of painting.

Choice of Pigments

The artist's choice of the pigments he uses is governed by consideration of their durability, their colour, their comparative transparency or opaqueness, and the possible chemical action of one pigment upon another. The ready solubility in water of some pigments, e.g. prussian blue, crimson lake, is an obvious recommendation for their use in water-colour painting.

Other mediums used include fresco, distemper (gum), encaustic (wax, worked with hot tools), pastel, and gouache, or body colour (water colour made opaque by admixture with Chinese white).

Prehistoric and antique painting was done with coloured earths. In ancient Egypt, as in ancient Greece, distemper was widely used, but the later Greco-Egyptian painting, which survived into the 2nd century after Christ, also used encaustic. The work of the mere journeyman painters in the mummy portraits of this period suggests a wonderful level of accomplishment, but though the Greeks must have created paintings as great as their sculpture, they are lost to us. The Egyptians used outline and colour, but the Greeks took to filling in the outline for drawing with its own colour, thus creating the silhouette, as in their vases.

The craft as we know it today began with the early Italians. They painted in fresco on walls, and in tempera on panels of wood, over which canvas had been pasted, with a plaster ground over the canvas. Fresco is water-colour on freshly laid plaster, with no glue to hold it; the paint is driven over the newly-laid plaster, and becomes the surface as it dries. Thus it cannot be retouched or altered. In these primitive frescoes the outline was drawn, and the colours laid in flat coats. The early painters concentrated on line, colour, and composition in their desire to illustrate the teachings of the Church, and the discipline of the medium compelled fine draughtsmanship. With the dawn of the Renaissance came first a desire to give the objects depicted a more solid appearance with the help of simple light and shade. Masaccio was one of the first to mass light and shade. Then came Uccello and others with their discovery of the laws of linear perspective, and Mantegna with his great interest in the foreshortening of the human figure. Piero della Francesca was one of the earliest experimenters in aerial perspective, or the recognition of the effect of atmosphere in giving depth to pictorial representation. Later painters, culminating in Leonardo da Vinci, strove to present objects more and more skilfully as though seen in the round, through modelling by shading.

Meanwhile in the Low Countries the brothers van Eyck had per-

fectured a method of oil painting of which the secret is said to have died with them. They painted in oil on a white gesso ground. There are mentions of the oil medium in the 10th and 12th cent., and in the 14th cent. it was said to be in use among German artists. Probably it was developed more readily in the northern countries because the moist air was deleterious to fresco. In Italy the use of oil was confined to coloured glazes over tempera painting, until Antonello da Messina (it is said) introduced the Flemish method. It was quickly adopted, if only because it lent itself, as other media did not, to alteration and retouching. The medium certainly demands an infinitely less strict discipline, and there are many who date a decline in painting from its introduction. Michelangelo despised it as "fit only for women"; but Pollaiuolo, Perugino, Verrochio, Ghirlandaio, and da Vinci all used it.

Methods of Oil Painting

The Venetian painters, working in a moister climate, adopted oils with most enthusiasm. Two techniques prevailed in Italy; the Flemish method, followed by the Florentines, in which a smooth impasto was imposed upon a monochrome underpainting in brown and white, with solid paint for the lights and transparent for the darks to preserve their luminosity; and the Venetian method, in which the underpainting was in full solid impasto, to which transparent oil glazes were added. Titian and Tintoretto were among the first to represent objects as seen "in the large," omitting conflicting details and leaving the broad masses to impress the eye. Titian painted in tempera a solid monochrome of massed light and dark, then painted his superb colour over all in oils.

The first to use the "direct" technique, painting directly on the canvas in full solid colour without subsequent glazes, were the *tenebrosi*, i.e. Caravaggio and his followers working in Naples. This great change was introduced into Spain (by Ribera) and Holland early in the 17th century. Velasquez in Spain, and Rembrandt

and Hals in Holland were all masters of the "direct" method. Velasquez, by his masterly representation of the tone values due to the nature of light, may be looked upon as the first of the Impressionists.

Direct painting led to an appreciation not only of the representation of the appearance of objects but in the technique of brushwork, and a handling of the loaded paint which took pride in displaying, rather than concealing, the sweep and mark of the brush. Painting became more than satisfied to be, not an aping of nature, but a frank translation of nature into terms of individual brush-marks. Painting technique could henceforward be enjoyed for its own sake.

Painting in Water Colour

Water-colour painting, long practised in Japan, found its most notable expression in England, especially in the early 19th century. Used almost exclusively for landscape painting, first as an enhancement to topographical drawings in line, it was found to possess a soft limpid quality particularly suited to the representation of the English atmosphere. Its use in flat transparent washes of harmonious colour is best seen in the work of Cotman. On the other hand, Turner used it supremely well as a means to an end, and was no purist in technique so long as he achieved the desired effect; he did not hesitate to use transparent colour, opaque colour, and additional effects obtained by the use of charcoal, sponge, or pen-knife, all in the same picture. The range of water colour is necessarily limited. In comparison with oil painting, it is chamber music rather than a full orchestra. *Consult Materials of the Painter's Craft*, A. P. Laurie, 1910; *The Pigments and Mediums of the Old Masters*, A. P. Laurie, 1914.

SCHOOLS OF PAINTING. The accompanying table sets out the chief historical schools of painting. They are considered in detail in different parts of this Encyclopedia. For Italian, French, German, and Spanish painting, see under the sub-heading Art in the articles on Italy, France, Germany, Spain. See also Dutch School of Painting; Flemish School of Painting; Impressionism; Pre-Raphaelites, etc. The English and Scottish schools are dealt with below under the separate sub-heading British Painting.

The period of the historical schools may be taken as coinciding with the conception of painting as

the art of representing the visual truth, sometimes for its own sake, sometimes subserviently to other ends, e.g. religion, and combining this visual truth with harmonious and pleasing design. The balance between visual truth and beauty of design varies with individual artists as well as with particular schools. Thus, broadly speaking, the Italians strove after types and forms of idealised beauty, while the Northern schools, German, Flemish, Dutch, and English, found

their most congenial expression in the representation of the individual character of people and things, i.e. were more *naturalistic*.

Still generalising, the Florentine school developed from the painting of frescoes in churches, and many of their greatest paintings are of religious subjects and have therefore a certain decorative monumental quality which was not forsaken when the decorations were painted for the walls of palaces and great houses and the subject

PAINTING: MAIN HISTORICAL SCHOOLS AND PERIODS

SCHOOL	SUBDIVISIONS	LEADING ARTISTS
ITALIAN	<i>Byzantine School</i> , 9th to 12th century <i>Siena</i> , 14th century <i>Florence</i> , 14th to 15th century <i>Venice</i> , 15th to 18th century <i>Milan</i> , 15th century <i>Rome</i> , 15th to 18th century <i>Naples</i> , 16th century <i>Bologna</i> , 16th to 18th century <i>Padua</i> , 14th to 15th century <i>Genoa</i> , 15th to 17th century <i>Ferrara</i> , 15th to 17th century <i>Parma</i> , 15th to 16th century	Margaritone, Cimabue Duccio Giotto, Fra Angelico, Filippo Lippi, Filippino Lippi, Botticelli, Paolo Uccello, Masaccio, Michelangelo, Carpaccio, the Bellini, Titian, Giorgione, Tintoretto, Paolo Veronese, Guardi, Canaletto, Tiepolo Leonardo da Vinci, Bernardino Luini, Raphael, Perugino, Giulio Romano Salvator Rosa, Caravaggio Francia, the Caracci, Guido Reni Squarcione, Mantegna Giovanni Battista Paggi, Bernardo Strozzi Dosso Dossi, Lorenzo Costa Correggio
FRENCH	<i>Classic School</i> , 17th century <i>Louis Quinze and Louis Seize</i> , 18th century <i>Classic Revival</i> , 19th century <i>Romantic School</i> , including <i>Fontainebleau Group</i> , 19th century <i>Realistic School</i> , 19th century <i>Impressionist School</i> , 19th century	Claude Lorrain (Gellée), Nicholas Poussin Watteau, Fragonard, Boucher, Greuze, Chardin David, Ingres, Puvis de Chavannes Géricault, Delacroix, Millet, Corot, Diaz, Rousseau, Monticelli Courbet, Bastien-Lepage, Constant, Bonnat Manet, Monet, Degas, Sisley, Renoir, Berthe Morisot
GERMAN	<i>Cologne</i> , 14th to 15th century <i>School of Swabia (Colmar, Ulm, Augsburg)</i> , 15th to 16th century <i>Nuremberg</i> , 15th to 16th century	Meister Wilhelm, Stephan Lochner Martin Schongauer, Hans Holbein the Elder, Hans Holbein the Younger Dürer
SPANISH	<i>Madrid</i> , 16th to 17th century <i>Seville</i> , 16th to 18th century	El Greco, Velasquez, del Mazo Fernandez, Vargas, Herrera, Cano, Zurbaran, B. E. Murillo
DUTCH 17th century		Rembrandt, van Rijn, van Goyen, Hobbema, van Ruysdael, P. Potter, A. van der Velde, Cuyp, Hals G. Dou, Vermeer of Delft, de Hooch, Terburg, Jan Steen, Adriaen Brouwer, Metsu
FLEMISH 14th to 17th century		Hubert and Jan van Eyck, Hans Memling, Roger van der Weyden, Quinten Matsys, Mabuse, Rubens, Van Dyck
BRITISH	<i>17th century Portraitists</i> <i>18th century Portraitists</i> <i>Subject and Landscape Painters</i> , 18th to 19th century <i>Pre-Raphaelite School</i> , 1848-c.1900	Lely, Kneller Reynolds, Gainsborough, Romney, Raeburn, Lawrence Hogarth, Morland, Crome, Turner, Constable, Cotman, Wilkie, Watts, Millais Holman Hunt, Rossetti, Burne-Jones

matter was classical rather than religious. There is much in common between *The Last Judgement* of Michelangelo and the great decorations of Paolo Veronese.

The early Flemish and German schools, developing the oil medium more suited to the northern climate, painted altar-pieces rather than walls, and their paintings are therefore smaller and more intimate, as well as revealing the greater northern interest in individual character. Rubens and Van Dyck are in a class by themselves. Rubens, as one of the world's supreme painters, came near achieving the perfect blend of classicism and naturalism. In the Spanish school, religious subjects also predominate and the conventions are more rigid, until the emergence of Velasquez and his court portraiture. The Dutch school, little concerned with religion, developed the smaller "easel" picture to meet the taste of the rich merchants of the republic—portraits, landscapes, seascapes, scenes of everyday life—and evinced new skill in the representation and development of *chiaroscuro*.

French painting was largely eclectic until the time of Watteau, who, with his immediate followers, found congenial subjects in light fancies reflecting the mood of 18th century France. A return to severe classicism with David and Ingres accompanied the Napoleonic period, followed first by a romantic reaction, then by a reversion to realism, as expressed in the landscapes of the Fontainebleau group, e.g. Rousseau.

Influence of British School

The next inspiration came from England, which early in the 18th century had found its métier in portraiture; in the so-called "historical" subject picture as painted by Copley and West and later deadened out of all recognition by such Victorian painters as Maclise, until rescued by the short-lived revolution of the Pre-Raphaelites; and towards the end of the 18th century, in landscape. Constable and Turner, the latter reaching new heights of technical achievement in the representation of sunlight, often by the comparative elimination of almost everything else, had an enormous influence on the development in France of the Impressionist school, which in seeking to represent the effect of light upon an object rather than the object itself brought logical finality to the search after visual truth. From the time of the

Impressionists the French school consolidated the leading position it had steadily acquired during the 19th century. Subsequent developments in the art are described in the special section Painting in the 20th century. Consult *A History of Painting*, 8 vols., H. MacFall, 1911; *The Approach to Painting*, T. Bodkin, revised edn., 1946.

BRITISH PAINTING. Painting was a late development in England by comparison with Italy, the Netherlands, Spain, and even France, and the development of anything like a "school" with recognizable national characteristics began only as late as the 18th century. But there had already been founded a tradition in portraiture, fostered by the sojourn in England of Holbein, under the patronage of Henry VIII, and that of Van Dyck as court painter to Charles I. The influence of these two great masters, however, was unfavourable to the emergence of any indigenous spirit in painting. The earliest English portrait painters of any note were Samuel Cooper, the miniaturist; Lely, court painter to Charles II; and Kneller, painter of the beauties and celebrities of the reign of William III and Anne.

Hogarth and his Followers

The first great painter to break completely and deliberately with foreign influence and give utterance to the English genius by portraying the world around him in terms of his own comprehension was Hogarth, supreme painter of the human comedy, who painted the life of the people and recorded the manners and satirised the follies of his age. Yet his genius stands outside any mainstream of development. It had no immediate followers. Contemporaneously, a British school of portrait painters was arising, with Hudson and Allan Ramsay as its first leaders. It reached its culmination in the great trio who dominated English portraiture in the closing decades of the 18th century; Reynolds, Romney, and Gainsborough. The precepts of Reynolds, as given in his *Discourses* addressed to the students of the Royal Academy, were more questionable than his practice; for he preached a "grand manner" in painting based on the scholar's study of the Italian old masters, even in choice of subjects, but his own art was more akin to that of the Dutch school in its fidelity to what his own eyes observed, and in its emphasis on individual

character in portraiture. Gainsborough, who found favour at the court of George III, had never visited Italy, and paid homage to Van Dyck, but his own original genius shines out clearly in his superb portraiture.

Meanwhile there had been an awakening effort in landscape in the "topographical draughtsmen" of the style of Scott and Saundby, which eventually brought forth England's first great landscape painter, Richard Wilson. Gainsborough also held landscape to be his province rather than portraiture, and contributed prodigiously to its development in his portrayal of the English rural scene. Two painters from the American colonies, Benjamin West and Copley, created a native school of historical painting, while Cosway and Downman raised the art of portrait miniature to higher standards.

The Royal Academy

The founding of the Royal Academy in 1768 was the outward expression of this sudden surging of native genius. Reynolds was its first president, and Gainsborough, Wilson, and West were among the original members. From that time the story of British painting became closely identified with that of the Royal Academy, which has remained the strongest single influence in the art of the country. Against that influence there have been frequent revolts, but they have been revolts against an admitted authority; and if there was any merit in the revolt, sooner or later the authority has almost always overtaken and absorbed it. The number of English painters of the first rank who have successfully dissociated themselves from the Royal Academy is very small.

As the 18th century ended, there came to the front a younger group of portrait painters—Northcote, Beechey, Hoppner, Opie, Lawrence, and, towering above them all, the Scottish master Raeburn. Stubbs was painting sporting life, horses, and dogs. Morland recorded the life of the countryside, the tavern, the stables, the pursuits of rural folk. By the year 1800, all that was most vital in the world's painting was British. The landscape painters were creating pure impressions of nature in lyrical fashion. In Norwich, Crome was going direct to nature, developing from where the 17th century Dutch painters had left off. Girtin was playing a great part in changing the art of

water-colour drawing into that of water-colour painting.

In Turner the British race found its supreme genius in painting; in the realm of landscape the supreme artist of all time, the equivalent of Shakespeare in literature and Beethoven in music. He employed colour more poetically than it had ever been employed before. Constable, in pursuit of ways to depict even more faithfully and directly the English scene and even more the English weather, had a forceful influence on French landscape painting, as had the short-lived Bonington. Beside them may stand the landscape painters of the Norwich school, led by Crome and Cotman; the water-colourists Cox, De Wint, and Prout; and painters of the sea like Clarkson Stanfield. Landseer won deserved fame in painting animals, Wilkie in rendering Scottish home life.

The "Subject" Picture But this fine flowering died away, and British painting was in danger of becoming stereotyped, but for the new life given to it by the Pre-Raphaelites, led by Holman Hunt, Millais, and Rossetti. With all their faults (their greatest being a subservience to the manner as well as the spirit of the Italian painters), they brought back vitality by taking their canvases out of the studios into the open air. The Victorian tradition of "subject" paintings, intellectual and literary rather than visual in conception, like large-scale coloured book illustrations, also owed much to their influence. Frith (painter of Derby Day, The Railway Station, and Ramsgate Beach) was among the most successful painters of such works, and this was the aspect of Pre-Raphaelitism most clearly retained by Millais after the dissolution of the Pre-Raphaelite Brotherhood.

Out of the primitive academism of the Pre-Raphaelites, through the influence of Rossetti, there grew the aesthetic movement of the 'sixties, whose greatest exponent was Burne-Jones. Its conventions remained early Italian, and it has as little to do with the expression of national genius as had the classical academism of which first Leighton, then Poynter and Alma-Tadema, were leading representatives.

The rise of Impressionism in France had its inevitable echo in England, where Whistler, an American, combined the theories of Impressionism with the decorative quality of Japanese art and

exploited an exquisite gift for interpreting nature's twilight moods. The movement found many other sympathetic followers to apply the methods of Impressionism to the English scene, notably Wilson Steer and Sickert. By the end of the 19th century Impressionism was accepted, with headquarters at the New English Art Club rather than at the Royal Academy, but its ultimate inspiration remained French. The last native movement of the century was Scottish, centring on Glasgow and developed by George Henry, John Lavery, Arthur Melville, E. A. Hornel, and others. It owed something to the

early Impressionists, something to the growing regard for tonal relationship or "values" in painting, and a good deal to the eager spirit of independence. The riotous palette of Melville and the pattern painting of Hornel represented a marked advance in the decorative use of fresh, strong colour, which among English painters of the same period found its fullest expression in the work of Brangwyn. Consult British Painting from Hogarth's Day to Our Own, W. Grant, 1945; Introduction to English Painting, J. Rothenstein, 1947; An Outline of Eng. Painting, R. H. Wilenski, 1948.

PAINTING IN THE 20TH CENTURY

John Rothenstein, Ph.D., Director of the Tate Gallery, London Here, following the general article on the art of painting, is an account of the principal movements and influences which, developed since Cézanne, have affected the practice of painting in the contemporary world. See also Art, Contemporary, and illus.

The painting of the 20th century is distinguished by a weakening of tradition which is without precedent—a weakening regarded by a number of responsible critics as a prelude to dissolution. As a result of this waning of authority the arts have assumed a bewildering variety of forms.

At the beginning of the century a reaction against Impressionism was gathering force. Impressionism may be described, in one sense, as the culmination of an endeavour (which had been in progress since the Renaissance) to depict the commonly accepted truths of natural appearance as closely as possible. The power to describe form in its complexity and plenitude had been won. But to the following generation it seemed that this victory had been won at too great a sacrifice.

For this generation Cézanne—though the least didactic of men, who gave little counsel beyond the recommendation of a close study of nature—became the most influential painter of the age; his monumental but not unsensuous art proved to be a point of departure for the chief contemporary movements. These movements manifested in common, in despite of the advice of Cézanne, an ever more pronounced disregard for the commonly accepted truths of natural appearance. The new climate which they brought with them proved to be one in which not only the realistic tradition but all traditions tended to disintegrate.

In the 20th century movements in painting quickly lost their momentum and identity: the individual personality rather than the school

became more and more the sole intelligible field of study. This process of dissolution notwithstanding, it is still possible to distinguish certain general movements. The most persistent of these is one deriving from the uncompromising radical movement known as Fauvism, of which Henri Matisse (b. 1869) was the leader. The Fauves set themselves to create a frankly architectonic and decorative art. The architectonic derived from the severely structural elements in Cézanne, the decorative from the strong flat colour of Gauguin. But this radicalism rapidly went further, and resulted in an attempt to create an essentially geometric art without discernible reference to the visible world, an art of self-sufficient formal structures. The most uncompromising manifestation of this widely spread phenomenon was Cubism, of which the leaders were Georges Braque (b. 1881), Juan Gris (1887-1927), and Fernand Léger (b. 1881). The abstract art which Cubism tended ultimately to foster flourished in France and Spain, but it was less well adapted to express the less logical but intenser vision of the North. Under the original inspiration of Van Gogh and later of the Norwegian Edvard Munch (1863-1944), there grew up a movement known as Expressionism, distinguished by highly charged emotion, by frank preoccupation with human drama, and by a violent, strongly coloured method of painting. Munch, who is little known in England, exerted a widespread influence in Central Europe. It would be erroneous to over-stress the part played by race and

environment, however, in determining the character of an artist: thus Georges Rouault (b. 1871), the most powerful French painter of the age, may be said to be an Expressionist, while Germany gave birth, in Franz Marc (1880-1916), to a characteristic Cubist.

Picasso and Surrealism

There also emerged a third movement, in its essence intuitive and subjective. Pablo Picasso (b. 1881), who expressed himself in many different styles (he was prominent among the inventors of Cubism), is perhaps most typical as a subjective painter. Of all the revolutionary movements in the arts, this involves the most radical departure from the older traditions, for it renounces not only the representation of the appearance of things, but a concept even more fundamental, namely, rational modes of apprehension. Picasso has declared that he does not know in advance what he is going to put on the canvas, any more than he decides in advance what colours to use; that, while he works, he takes no stock of what he is painting; that he feels every time he begins a picture as though he were throwing himself into the void. Implicit in this statement is a total renunciation of the objective world, and a total turning inwards of the artist's vision, so that the contents of his own mind—his irrational fancies or his unconscious self—becomes the sole subject of his art. The art, entirely subjective, resulting from such an introversion may be described as one of free abstract symbolism. The influence of Freud in the creation of such an art is conspicuous.

Surrealism, a related but distinct development of subjective art, also derives directly from Freud. It is not, however, based exclusively upon the unconscious; it rather attempts, by the juxtaposition of dream imagery with meticulously rendered objects as observed by the conscious eye, to express, in all its variety and contradiction, the whole content of the mind. Loosely associated with this movement, but difficult to classify precisely, are Paul Klee (1879-1940), and Marc Chagall (b. 1887), both painters of poetic and highly personal fantasy.

During the earlier part of this period British painting cannot be said to have played an important part in the initiation of any of the successive movements by which the character of Western art has been determined, but all

of them have had significant exponents in Great Britain. Wilson Steer (1860-1942) and W. R. Sickert (1860-1942) were indebted to the Impressionists, J. D. Innes (1887-1914) and Augustus John (b. 1878) to Gauguin, Matthew Smith (b. 1892) and Duncan Grant (b. 1885) to the Fauves, Paul Nash (1889-1946) and Edward Wadsworth (b. 1889) first to the Cubists, later to the Surrealists. Surrealism and the abstract movements continue to exert an influence upon the younger generation, but their work, although it derives from the mainstream of Continental art, is not only highly personal but markedly national in feeling. During the Second Great War, when contact with the Continent was interrupted, the strong native spirit of romantic poetry asserted itself, stimulated by the emotional freedoms of contemporary European art.

The presence of this spirit in the work of Henry Moore (b. 1898), Graham Sutherland (b. 1903), David Jones (b. 1895), Edward Bawden (b. 1903), Eric Ravilious (1903-1943), John Piper (b. 1903), and Edward Burra (b. 1905) is sufficiently apparent. Its most obviously English expression is to be found in the work of Stanley Spencer (b. 1892), whose mural paintings in the memorial chapel of the Oratory of All Souls, at Burghclere, constitute one of the few major monumental works of art carried out in England during the present century.

The war had a further important effect upon British artists. They were, like other men, deeply moved by the spectacle of tragedy and ruin and struggle, and official patronage gave them every occasion to express their feelings and has even pointed the way to themes which have evoked in them an earnest response. As a consequence, many artists who might have seemed, before 1939, to have cultivated an esoteric vision, found, in their response to the war, a common ground of contact with the public, thus narrowing the lamentable rift which has tended to place the artist, increasingly immersed in theory or in personal idiosyncrasies, in a position of unprecedented isolation.

Painting and Decorating.

Painting is the application of paint for the protection from atmospheric action of the surface to which it is applied. Decorating is more specifically artistic in purpose. It includes the application of decorative washes and paints to

interior walls and ceilings, paper-hanging, stencilling, and decorative painting.

Various kinds of paint used for different purposes are described under Colour Mixing; Paint.

Brushes are of numerous types, but for fairly wide surfaces bevelled varnish brushes are best, and for narrow surfaces brushes called sash tools should be used. A special distemper brush should be used for applying distempers and colour washes. Good finishes can only be obtained with good quality brushes. After use they should be cleaned in methylated spirit and washed in warm soapy water. Surfaces must be clean and dry. Dirt causes harmful chemical action; moisture, too, may cause chemical action, and will certainly blister the paint film.

Old paint in bad condition is stripped with blow lamp and scraper, or a chemical stripper may be used. Bare wood, whether new or old, is glass-papered, and any holes or splits stopped with putty or special stopping. Loose or resinous knots are cut out and the holes plugged. Old paint in fair condition is washed down with weak soda or sugar soap, then with clean water, and if necessary rubbed with fine glass-paper to give a smooth surface. Iron and steel must have all rust and scale removed. Chisels, scrapers, and emery cloth are used for this.

The Three Coats

Standard practice is to use three coats: priming, under-coat, and finishing coat. The function of the primer is to cover or eliminate irregularities in the surface. On such surfaces as plaster and wood-work, apart from roughness, there is irregularity in the power of absorbing liquid media. The priming coat is therefore designed to satisfy these irregularities and to fill the pores of the surface, leaving a firm adherent coating of pigment which can, if necessary, be rubbed down and provide a secure foundation for the subsequent coat. The under-coat covers the surface and provides at once a foundation for the top coat and good adhesion to the primer. Paint films expand and contract with changes in temperature and humidity and considerable volume changes also occur during the drying and ageing of the film. Too great a difference in constitution between consecutive coats would result in corresponding great differences in such changes and consequent danger of separation. The design of coatings so as to provide a reasonably

graded change of properties from top to bottom is therefore an important matter.

A red lead paint is often used as a primer on wood and iron. Special primers are made for use on plaster surfaces, though new plaster does not take oil paint well. On old paint in good condition one coat of the same colour, after cleaning, is enough. For exterior work a finish of one coat of outside varnish is a good protective. Aluminium paint adheres well to metal; and is a good primer on both metal and wood; a special heat-resisting grade is made for painting radiators.

The application of paint by brush is too slow for use in mass production methods, and in many cases would not give such satisfactory results.

Dipping is suitable when the article is such that the paint can run off uniformly and also where the function of the paint is essentially protective, for the paint penetrates every part of the surface including those which the brush could not reach. It is used for such things as carriage and motor parts and is particularly adapted where drying is effected by stoving. The articles are hung on a travelling belt which carries them through the paint bath and thence through the drying chamber without further handling.

Flowing is used on large flat surfaces, e.g. the sides of wagons. The paint is applied at the top, flows over the surface, and drains into a trough from which it is pumped up for future operations.

Spraying is mainly used in the application of lacquers which dry entirely by evaporation, e.g. cellulose lacquers. It can be used also for applying oil paint. The paint is forced through a fine nozzle in the form of a spray. The paint thus impinges on the surface with considerable force and most of the volatile solvent is rapidly evaporated. This method, in conjunction with quick drying paints and lacquers, is capable of giving the rapid completion necessary to keep pace with the speed attained in other stages of mass production, as in the motor industry.

Graining is the imitation in paint of natural wood grain. Oak and mahogany can be imitated on cheap whitewoods. Usually a buff-coloured ground is applied to the priming coat, and is followed by the graining coat, of the colour of the wood to be imitated. Before the latter dries, it is brush grained with a dry brush or combed with

a steel comb. Grain figure should be imitated but not the knots, which are defects.

Staining is usually done in imitation of a hardwood. Thus, there are oak and mahogany stains. Water stains, though easily applied, raise the grain. Spirit stains are better, but show the joins. Oil stains are best. Both oil staining and graining should be finished with a coat of hard clear varnish. (See also French Polishing.)

For decorative work, egg-shell matt finishes, high gloss enamels, cellulose paints, plastic paints (giving a rough-textured finish, and manipulated with special brushes), and graining are widely used.

In decorating walls, oil paint on plaster and concrete surfaces may be attacked by free lime in the wall, especially in new work. Special plaster and wall primers are made to give protection from free lime. Asbestos-cement also needs a special primer.

PAPERHANGING. Suitable decorative paper can be applied to walls and ceilings with an adhesive. The plaster surface should be smooth and defects should be made good. On new plaster a coat of size should be given to stop the pores. Paste is sold ready-made for admixture with water, but a flour and starch paste is good. Wall paper is supplied in rolls or "pieces," $11\frac{1}{2}$ yds. by 21 ins. wide. Plain, patterned, and embossed papers are made. For small rooms, neat unobtrusive patterns and plain stipple embossed papers are usually preferred. On a bad surface a lining paper should be used, the wallpaper being pasted over it. Lining paper can be distempered if desired.

The paper is placed on a boarded trestle table for pasting. In placing it on the wall, the top right hand corner is attached first against the picture rail or a ruled line, the left hand corner is raised or lowered to bring the paper plumb, and the dry brush used to

press it on to the wall, working from the top downwards.

For attaching to ceilings, the paper is folded, concertina fashion, over a roll which is lifted with one hand while the end is attached with the other.

Joints are made to lap into the light, so that no shadow is cast by the outstanding edge. This is achieved by starting the papering nearest the largest window.

Lincrusta and other embossed materials are stiffer than paper, and can be oil painted if desired. The sheets are fixed in place with adhesives.

Paisiello, GIOVANNI (1741-1816). Italian composer. Born at Taranto, May 9, 1741, he studied at Naples and there began to compose. During 1776-84 he was in the service of Catherine of Russia, after which he returned to Naples, where for 12 years he was master of music to Ferdinand IV. He attended the court of Napoleon during 1802-03. He died June 5, 1816. Paisiello's 94 operas included *The Barber of Seville* (supplanted by Rossini's), and he composed church music.

Paisley. Mun. burgh, river port, and market town of Renfrewshire, and fifth town of Scotland.



Paisley arms

It stands on the White Cart, near its union with the Clyde, and is served by five rly. stations, being 7 m. W. of Glasgow. Renfrew airport is a mile distant. The old town is on the W. of the river and the new town on the E. The parish church is the abbey, restored to its former magnificence; it includes a chapel which contains tombs of some of the Stuarts. There are a town hall, municipal buildings, county buildings, observatory, free library, and museum. There is a grammar school of 1576 and a technical school.



Paisley, Renfrewshire. View of this old Scots town showing Paisley Abbey, which is also the parish church, and the Clark Town Hall

The chief industry is the manufacture of thread, for here are large mills of the firm of Coats. Other manufactures include dyeing, bleaching, distilling, and making carpets, chemicals, starch, soap, preserves, etc. Shipbuilding and engineering are carried on. There is a harbour, and owing to the deepening of the river large vessels can reach the town.

Originally called Passeleth, Paisley grew up around an abbey founded about 1160. With its extensive lands it was given to a layman at the Reformation. In 1488 it was made a burgh. About 1700 it began to be a manufacturing centre, famous shawls being made; but the introduction of cotton thread industry about 1810 laid the foundation of its real prosperity. In the "Paisley panic," Dec. 31, 1929, many children were killed in a cinema after an alarm of fire. Paisley is administered by a burgh council and has one M.P. Market day, Mon. Pop. est. 92,400.

Paithan. Town of Hyderabad, India, in Aurangabad dist. It stands on the Godavari, 30 m. S. of Aurangabad, on the border of Bombay state. One of the oldest cities of the Deccan, it formerly had a great reputation for its excellent silk goods. Pop. 12,500.

Pakenham, FRANCIS AUGIER PAKENHAM, 1ST BARON (b. 1905). British politician. Son and heir



Lord Pakenham,
British politician

presumptive of the 6th earl of Longford, he was born Dec. 5, 1905, and educated at Eton and New College, Oxford. He worked at first for the Conservative party, but developed Labour views while a lecturer, and from 1934 was student in politics at Christ Church, Oxford. During the Second Great War he was forced by ill health to resign an infantry commission, and was personal assistant to Sir William (Lord) Beveridge, 1941-44. He was made a peer in 1945, under-secretary for war in 1946, and next year chancellor of the duchy of Lancaster, with responsibility for administration of the British zone of occupation in German. In 1948 he became minister of civil aviation.

Pakistan. A self-governing dominion of the British Commonwealth. It came into existence on Aug. 15, 1947, with the transfer of

British sovereignty in India to the two newly created dominions of India and Pakistan. It consists of the provs. of Punjab (W. Punjab until 1950), capital Lahore; E. Bengal (including the Sylhet dist. formerly in Assam), capital Dacca, chief port Chittagong; N.W. Frontier, capital Peshawar; Sind, capital Karachi (capital also from 1948 of Pakistan); and Baluchistan. E. Bengal is often referred to as East Pakistan.

Bahawalpur and Khairpur, the Baluchistan states of Kalat, Las Bela, Kharan, and Mekran, and the N.W. Frontier states of Amb, Chitral, Dir, Phulera, and Swat acceded during 1947-48.

Total area, 360,000 sq. m. Pop. (est. 1950) 81,500,000.

The movement for Pakistan, originated by C. Ramat Ali of Cambridge University in the U.K. during the round table conferences of 1930-31, aimed at the creation of a separate sovereign state composed of the predominantly Muslim areas of the sub-continent of India, i.e. Punjab, Afghanistan and the N.W. Frontier prov., Kashmir, Sind, and Baluchistan, the name Pakistan, later interpreted as the land of the pure (Urdu *pak*, pure), being formed from the italicised letters. In 1940 the founder added Bengal, Assam, and Hyderabad to this list.

The movement at first attracted little attention either in India or in the U.K.; but in 1940 the Muslim league, under the leadership of M. A. Jinnah (q.v.), passed a resolution declaring that the Muslim league majority regions must be grouped "to constitute independent states."

Muslim opinion was far from unanimously in favour of the partition of British India, but Cripps's mission of 1942 failed chiefly because the Muslim league insisted on an independent Pakistan and the Congress party opposed partition. All later efforts to produce a scheme for the transfer of power to Indian hands proved abortive for the same reason until Lord Mountbatten, sent out as viceroy in 1947, persuaded the British govt. that transfer to a united India was impracticable.

Jinnah was appointed first govt. gen. of Pakistan, and on his death Sept. 11, 1948, Khwaja Nazimuddin, premier of E. Bengal, was chosen to succeed him. Drawing up of a constitution proceeded slowly. Appeal to the British privy council in civil cases was abolished in 1950. Prohibition was intro-

duced in Sind and W. Punjab in 1949, in E. Bengal in 1950.

Disputes with India over small parts of the boundary between E. and W. Bengal and E. Bengal and Assam were settled by a joint judicial tribunal under Swedish chairmanship Feb., 1950. For other disputes with India, see India, Republic of; Kashmir.

Pakokku. Dist. and town of Upper Burma, in the Magwe div. The dist., which covers 6,210 sq. m., lies N. of Minbu, W. of the Irawadi. Oil seeds, pulses and a little rice are grown. The Yenangyat oil fields yield petroleum. Pop. 559,871.

The town is on the right bank of the Irawadi, below the Chindwin confluence, and is the centre for the timber trade in logs floated down this tributary; there is also boat building. In Japanese occupation since May, 1942, it was recaptured by Gurkha and Indian troops, March 7, 1945. Pop. 30,000.

Palace of Peace. Building between The Hague and Scheveningen, designed to house the permanent court of arbitration created by the peace conference of 1899. In 1903 an endowment of £300,000 for its erection was made by Andrew Carnegie (q.v.), and the building, designed by the French architect Cordonnier, was begun in 1907 and inaugurated on Aug. 28, 1913, by the queen of the Netherlands in the presence of the representatives of 42 states. Its grounds cover 16 acres, and the building, in brick and stone in the Flemish-Dutch style, is about 260 ft. square. See Hague, The.

Palace Theatre. London playhouse, in Cambridge Circus, W.1. Planned as the home of British opera by D'Oyly Carte, it was designed by T. E. Colcutt, and opened as the Royal English Opera House, Jan. 31, 1891, the first production being Sullivan's *Ivanhoe*. A few months later Sarah Bernhardt gave a season. The interior was then altered, and the house reopened in 1892 as the Palace Theatre of Varieties. Maud Allan made her London debut here in 1908, and Pavlova in 1910. Herman Finck was musical director from 1900-21. During the First Great War light musical shows were introduced, and notable later successes were *No, No, Nanette*, 1925; *Anything Goes*, 1935; and a series of Hulbert-Courtneidge shows 1941-42. The theatre seats 1,380.

Palace Yard. OLD. Open space between the British houses of parliament and Henry VII's



Palace Yard, Westminster. The Old Yard, looking towards S. Stephen's Hall, with peers' entrance on right

chapel. Here Guy Fawkes and Raleigh were executed and Prynne was pilloried. Chaucer and Ben Jonson are believed to have lived in houses that once stood near. The statue of Richard Coeur de Lion by Marochetti was erected in 1860. The peers' and visitors' entrances to the houses of parliament are in Old Palace Yard. New Palace Yard is a railed-in space N. of Westminster Hall, forming the members' entrance to the house of commons. See Westminster.

Palacio Valdes, ARMANDO (1853-1938). Spanish novelist. He was born at Entralgo, Asturias, Oct. 4, 1853, becoming a journalist and editor of *Revista Europea*, in which his first essays appeared. His first novel, *El Señorito Octavio*, 1881, was followed by *Marta y Maria*, 1883; *El Cuarto Poder* (The Fourth Power), 1888; *La Hermana San Sulpicio*, 1889; *La Espuma* (Froth), 1892; *La Aldea Perdida*, describing his native region, 1902; *Los Carmenes de Granada*, 1928; *Tiempos Felices*, 1933. His fiction shows a deep love of nature and sympathy with the working people, and is sometimes satirical at the expense of the more frivolous members of society. He died in Feb., 1938.



A. Palacio Valdes.
Spanish novelist

Paladin (Lat. *palatinus*, belonging to a palace). Word, a variant of palatine, meaning a courtier or member of the royal household. It is known, however, especially because it was used for the 12 legendary figures—peers, as they are called—who are supposed to have gone with Charlemagne to Spain. Owing to the glamour that surrounded them the word was afterwards used for a knight

are presumably the descendants of ancestors which lived in an earlier period of the earth's history, and were themselves descended from still older types.

The vegetation of which we know most is that of the coal period. Palaeobotanical research has revealed the existence in the forests of the coal period of genera exhibiting a combination of characters which are now distributed among different families or groups. These extinct generalised types demonstrate a close affinity between certain groups which in their modern representatives show little indication of relationship.

The oldest rocks in the earth's crust contain no fossil plants, but their absence does not necessarily mean that there was no vegetation when the strata were in process of formation; probably both animals and plants existed, but such remains as were entombed in the oldest sedimentary rocks have been rendered unrecognizable, or completely destroyed in the course of the repeated foldings of the earth's crust. The most ancient undoubted plants so far discovered are more highly organized than one would expect of members of a primitive flora; their advanced stage of differentiation suggests that they were preceded by earlier phases of plant evolution.

There were no flowering plants in the forests of the carboniferous epoch, but many trees were members of the class Pteridophyta, which includes the ferns, club mosses (*Lycopodium*), and other genera, horsetails (*Equisetum*), and other types. Many of these plants had the dimensions of fairly large trees, and differed considerably both in size and their greater complexity of structure from their relatively small and herbaceous descendants at the present day. There were also many plants in the

of exceptional gallantry. See Palatine; Roland.

Palaeobotany (Gr. *palaios*, ancient; *botanē*, plant). Study of the plants of former ages. After the publication of Darwin's *Origin of Species* in 1859, the investigation of the remains of extinct animals and plants assumed a new significance. The plants of today

coal period, which in some respects presented a close resemblance to some existing ferns, but differed from them in certain characters, and, more especially, in the production of true seeds; these genera are included in the class Pteridosperms instituted for palaeozoic fern-like plants bearing seeds. The Pteridosperms are of special interest, because the production of seeds is now the monopoly of plants higher in the scale than the ferns and their allies. See Botany.

Palaeogene Deposits. In geology, name given to Older Tertiary deposits. See Tertiary.

Palaeogeography. Study of the distribution and changes of land and sea areas and variations in climatic conditions in past geological times. The character of the rocks laid down yields information regarding the conditions under which they were deposited—in shallow water, lakes, or as sand dunes, etc. The fossil content indicates changes in conditions, as well as dating the age of deposits, and relates the science to that of Palaeontology (*q.v.*).

Palaeography (Gr. *palaios*, ancient; *graphein*, to write). Study of ancient handwriting. It concentrates upon the forms of writing in inscriptions on plant materials, such as papyrus, vellum, and paper. That branch of it which concerns inscriptions on hard materials, such as stone, metal, and wood, is called epigraphy. With undated MSS., palaeography is often able to decide problems of date by considerations of style. It is also of decisive importance in determining the genuineness of documents.

Ancient MSS., mostly in the form of rolls, tablets, or books, sometimes occur on leaves, bark, linen, potsherds, and wood boards. The writing implements were pointed, split, or frayed reeds, stiles and quills, the hairbrush being of Chinese invention. The scripts tend to become running or cursive hands, as distinct from the stiffer and more formal characters demanded by the art of stone-chiselling. Hence the hieroglyphic characters of Egyptian stone inscriptions passed, even in the 1st dynasty, into hieratic, and in the XXVIth dynasty into demotic.

Greek palaeography is traceable through numerous examples, especially on papyrus and vellum, from the 4th century B.C. down to the introduction of printing into Europe. Beginning with uncial or capital letters, it passed into minuscule or small-hand. Of this

two styles were in use: book-hand, which displaced papyrus by vellum in the 4th century of our era, and non-literary cursive, which was employed for the ordinary business of life. Slavonic hands descend from 9th century Greek forms.

Latin palaeography is of wider importance, because it deals not only with Roman scripts, uncial and minuscule, but also with those national hands which grew out of them in every part of Europe. By 800 there emerged the Carolingian hand, greatly influenced by Alcuin of York's youthful familiarity with English writing. This became the standard calligraphy of W. Europe, as distinct from the rugged Germanic black letter, until the dissemination of the Italian hand during the Renaissance. The non-literary cursive and the court-hands, which developed side by side with the book-hands, are the precursors of the various modern systems of calligraphy, which in their turn are being affected by the growing use of the typewriter.

The methods of European palaeography have been utilised for the study of non-European hand-writings. Among these the most important are Hebrew, Syriac, Coptic, Arabic, Persian, Indian, Pali, and Chinese. See Anglo-Saxon Chronicle; Bible; Codex; Graffiti; Ostraca; Uncial; Writing. Consult History of the Art of Writing, W. A. Mason, 1921.

Palaolith (Gr. *palaios*, ancient; *lithos*, stone). Stone implement or weapon of the early Stone Age. Intermediate in workmanship between colths and neoliths, they were produced by chipping and flaking flints and other hard stones. Unpolished products were used as hand-axes, hammers, scrapers, borers, cutting tools, javelin heads, and saws. See Flint Implements.

Palaolithic. Term introduced by Lubbock, afterwards Lord Avebury, to denote the older phase of the prehistoric Stone Age civilization which preceded the use of metals. This phase was itself preceded by the Eolithic, characterised by the production of still cruder stone implements called colths, and was followed, after an intermediate or Mesolithic period coinciding with the end of the last ice age and the appearance of forest and forest fauna in Europe, by the Neolithic Age.

In prehistoric Europe and N. Africa evidence drawn from the development of style, the relative position of stratified remains, and their association with the bones of extinct animals, has enabled the

Palaolithic Age to be divided into six consecutive periods: Lower and Middle: Abbevillian (Chellean), Acheulian, Mousterian; Upper: Aurignacian, Solutrian, Magdalenian. Each is marked by characteristic types of flint working, and by an advancing growth of material achievement, fine art, including the impressive series of Magdalenian cave drawings in N. Spain and France, and of social organization.

The Palaolithic Age coincided with the Pleistocene geological era, and lasted for many thousands of years. Remnants of its type of culture survived up to the 19th century at the farthest land extremities of the earth, as in Tasmania and Tierra del Fuego. See Anthropology; Art: Prehistoric and Primitive; Man; Stone Age.

Palaologus. Name of a Byzantine family, which founded the last dynasty of East Roman emperors, lasting from 1261 to 1453. Michael VIII (1261-82), emperor of Nicea, overthrew the Latin empire, and recovered Constantinople from Baldwin II. A successful soldier and administrator, he in vain endeavoured to heal the schism between the Eastern and Western Churches. He was succeeded by Andronicus II and III (q.v.). John V (1341-91), who until 1355 had to acknowledge John Cantacuzene (q.v.) as emperor, was afterwards dependent upon the sultan of Turkey for his position. Manuel II (1391-1425), immediately after his accession, became engaged in hostilities against the Turks. Alarmed for the safety of Constantinople, which was being besieged by Bayazid, Manuel sought the aid of Western Christendom. In response to his appeal, an army commanded by the Roman emperor Sigismund set out to help him, but Bayazid gained an overwhelming victory at Nikopolis in 1396. Manuel then came to terms, but the capital was in constant peril until the defeat of Bayazid at Angora in 1402. From that time during the reign of Mohammed I, the son of Bayazid, Manuel was at peace.

On the accession of Murad II, Constantinople was again besieged, and Manuel, forced to agree to a humiliating treaty, retired to a monastery, where he occupied himself with the composition of theological works. John VIII (1425-48), to stem the threatened advance of the Turks, endeavoured to obtain help from the West by renewing the attempt to heal the ecclesiastical schism. An agreement was

actually concluded in 1438, but was rendered useless by the opposition of the Greek clergy and the people of Constantinople. The last representative of the family was Constantine Palaologus (q.v.), with whom the East Roman empire came to an end in 1453.

Palaontology (Gr. *palaios*, ancient; *onta*, beings; *logos*, science). Study of past life on the globe, especially as revealed by fossil remains. The term embraces the study of fossil plants, palaeobotany (q.v.), as well as of fossil animals, palaeozoology, but is often used of the latter alone. The description of the fossil organisms themselves is called palaeontography.

Palaontology subserves the invaluable purpose of establishing the relationship in time of the stratified rocks. Documentary evidence furnished by fossils shows that the earth's crust has passed through three great time-divisions or eras, called Palaeozoic, Mesozoic, and Cainozoic, to denote ancient, middle, and recent life respectively.

It has supported with overwhelming evidence the view propounded by Darwin that the history of life is one of orderly development. Life cannot be traced to its first beginnings, and many links connecting species with species, or class with class, are missing. But some remain however, such as Archaeopteryx, which helps to explain how reptiles developed into birds.

Geographical distribution of animals and plants is the result of migrations, often in remote geological time. The presence of opossums in S. America, all other pouched mammals being confined to the Australasian region, becomes intelligible when it is shown that marsupials originated in Europe, whence they spread to mesozoic America, probably reaching Australia over an Antarctic land-bridge. The lemurs of Madagascar are explained by an eocene land-bridge which connected the island with either Africa or India.

Study of fossil forms throws light upon the changes from epoch to epoch in the relation of land to water, variations of climate and rainfall, etc.; this is the study of palaeogeography. The presence of the hippopotamus in pliocene East Anglia betokens a tropical temperature; that of the woolly rhinoceros in the Thames valley later on proves sub-arctic conditions. Fresh-water organisms have enabled vanished lakes and

ivers to be mapped, while marine faunas in overlying beds point to forgotten seas.

Lastly, palaeontology yields interesting evidence concerning the physical history of man. The fossil bones of primeval man and his forerunners are rare. But when associated with those of mammals long extinct they enable valuable



Palais Royal, Paris. The main building of the old Palais Royal, now occupied by, and called, the Conseil d'Etat

conclusions to be drawn, not only concerning the great antiquity of the human race, but also concerning the environment in which man wrought out to a final issue the age-long struggle for the primacy of the world. *See* Evolution; Fossils; Geology; Stratigraphy; consult Textbook of Palaeontology, K. A. von Zittel and C. R. Eastman, vol. 1, 2nd ed. 1913, vol. 2, 1902; The Age of Mammals, H. F. Osborn, 1910; Invertebrate Palaeontology, H. L. Hawkins, 1920; Outlines of Palaeontology, H. H. Swinerton, 1947.

Palaeezoic. Name given to the era containing the earlier fossiliferous geological systems from the Cambrian to the Permian. The term includes the Cambrian, Ordovician, Silurian, Devonian, Carboniferous, and Permian periods, and rocks of these periods contain fossils of the earliest known forms of life. *See* Cainozoic; Mesozoic.

Palaephatus. Greek writer, under whose name is preserved a small work entitled Concerning Incredible Things. It contains a collection of myths, accompanied by allegorical interpretations. He is supposed to have been a native of Egypt or Athens, and to have lived in the 3rd century B.C. He has also been identified with Palaephatus of Abydos, a friend of Aristotle and the author of several historical works. The work was at one time a favourite schoolbook.

Palaestra (Gr. *palaistra*, wrestling school). Word used in various senses: (1) A place where Greek boys were taught gymnastic exercises; (2) part of the gymnasium reserved for wrestling bouts; (3) later, the gymnasium itself.

Palagonite. Dark yellowish-green alteration product of glassy basaltic lava. It usually occurs in ash or tuff beds, and also among the red clays on the bottom of the sea. It is found in Iceland, Sicily, and the Canary Isles.

Palais Royal. Palace in Paris. It was designed by Lemercier for Richelieu. The original building,

begun in 1629, consisted of an entrance front, with a courtyard enclosed by buildings behind it, continued in a main court, with gardens, now public, at the rear. During Richelieu's life it was known as the Palais Cardinal. The palace suffered from restoration, and in 1871 part of it was destroyed. It was subsequently the home of the Orléans family, and later housed the *Conseil d'Etat*.

Palamedes. In Greek legend, a hero who fought on the Greek side in the Trojan War, noted for his sagacity and inventiveness. He is not mentioned in Homer. Hated by Odysseus, he was put to death on a trumped-up charge of treachery. *Pron.* Palla-mee-deez.

Palamkotta, PALAMCOTTAI, OR PALAYAM-KOTTAI. Town of Madras state, India, in Tinnevely dist. An inland town, it is the dist. headquarters, an important road junction, and on the rly. line from Tuticorin and Madras to Travancore. Pop. 30,967.

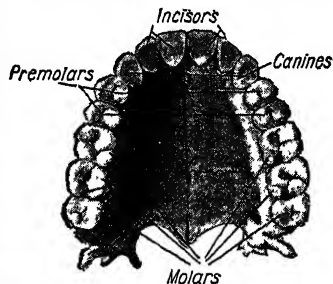
Palanpur. Town and former state of India, the latter now merged in Bombay state. Its area (1,794 sq. m.) lies between Baroda and Rajputana, and is crossed by the rly. from Mehsana to Ajmer. Wheat, rice, and sugar-cane are grown. The town, 83 m. N. of Ahmadabad, is a rly. junction for the branch line to Deesa. Pop. of former state 315,855; town, 18,000

Palanquin OR **PALKI** (Skt. *paryanka*, a bed). Eastern conveyance for one person, in the form of a litter, borne on the shoulders of two, or more generally four men, by means of poles passed through rings at each end. Originally open,

it is now an enclosed box, with sliding panels or latticed shutters.

Palar. River of Mysore and Madras, India. It rises in Mysore, cuts through the E. Ghats and reaches the Bay of Bengal, 50 m. S. of Madras city. Usually all the water is used for irrigation, and none flows to the sea. It supplies the Kolar goldfields. The chief engineering work is the anicut or dam at Arcot. The length of the river is 230 m.

Palate. Roof of the mouth, separating the cavity of the nose from the mouth. It consists of the hard palate in front, formed mainly by the two palate bones, and the soft palate behind, consisting of muscular tissues between two layers of mucous membrane. It is prolonged into a pointed structure, the uvula, which hangs downwards and can be seen at the back. The soft palate shuts off the pharynx from the cavity of the mouth. Inspection of this will give information as to the health of sinuses and neighbouring tissues. During the



Palate. Diagram indicating relative positions of the teeth and the palate bones

act of swallowing food or of coughing, the soft palate is drawn up so as to cover the entrance of the nasal cavity. *See* Anatomy; Cleft Palate; Mouth.

Palatinate (Ger. *Pfalz*). Area in S.W. Germany. This historic name comes from its ruler, the most important of palatine counts deputising for Frankish monarchs before Charlemagne. In 1156 the



Palanquin of the type which is in common use in China

emperor Frederick I invested his brother Conrad with the territory and the title of count palatine of the Rhine. As a principality the country covered about 3,300 sq. m.; as part of Bavaria before the Second Great War it covered 2,120 sq. m. It was ruled from Heidelberg, where its sovereigns, from 1,228 members of the Wittelsbach dynasty, developed political and cultural activity. They produced two emperors, also the hapless "winter king," Frederick, son-in-law of James I of Great Britain. They introduced Protestantism in 1556.

France laid claim to the Palatinate inheritance and devastated the country in 1689. In 1777 the Bavarian Wittelsbachs united the Palatinate with their mainlands, part of which, around Regensburg, had been called the Upper Palatinate. Temporarily joined to France, the Palatinate, after ceding parts to Baden, Hesse, and Prussia, was set up as a Bavarian province in 1815. It was occupied by French forces after both Great Wars. In 1946 it became part of the *Land* of Rhineland-Palatinate (*q.v.*). Wine and tobacco are grown. The capital is Speyer (Spire). See Bavaria.

Palatine (Lat. *palatium*, a palace). Literally, someone belonging to the palace, and therefore a servant of the ruler. In the Roman Empire the title was given to certain officials sent out by the emperors to discharge special duties, and this use passed into France and Germany, where counts palatine appeared about the 8th century. These were more directly the representatives of the sovereign than were the ordinary counts. Their territories were called palatinates. The most important was the one that grew into the Palatinate of the Rhine.

The word, used in practically the same sense, passed into England soon after the Norman Conquest. The earls of certain counties, generally those on the borders, such as Durham and Cheshire, were given special privileges, and these were known as counties palatine. Other counties palatine were Lancashire, given the privilege in the 14th century, Shropshire, Pembrokeshire, and Kent. Durham, Cheshire, and Lancashire were, however, the only ones that retained their special privileges for any length of time, and traces thereof still remain.

Palatine Hill (anc. *Mons Palatinus*). One of the seven hills of Rome. The name is derived from Pales, the goddess of shepherds,

who was worshipped here. Originally it comprised two summits, 168 ft. and 165 ft., separated by a saddle, but during the development of the city the shape has been modified. It was the site of Roma Quadrata, the "square" town, so called from the shape of the Palatine, which contained the fig-tree and thatched hut of Romulus. Parts of the walls are still to be seen. When other hills were included, Roma Quadrata developed into the Septimontium, or circuit of the seven hills. In republican times the hill was a residential quarter; Augustus and Tiberius had palaces there, and Nero's Golden House extended from the Palatine to the Esquiline. Slight excavations were made in the 16th century; many works of art were laid bare and carried off to other Italian cities from the central area in 1721-30. Systematic excavation has been continued by the Italian government since 1870. See Rome.

Palau Islands. Name for the group of Pacific islands more often called Pelew Islands (*q.v.*).

Palauing. Burmese name for aboriginal tribes of Mon-Khmer speech in upper Burma. Calling themselves Ta'ang, numbering about 150,000, and allied to the Wa, they are hill-dwellers, mostly in Tawngpeng, Mongmit, and other Shan states, as well as the E. of the Ruby Mines dist. They were driven out of the Irawadi and Mekong headwaters in recent times by Shan and Kachin pressure. Outside their chief settlements they are usually called Pales.

Palawan or PARAGUA. Island of the Philippines. Situated to the W. of the more important islands of this group, it is about 270 m. long and from 4 m. to 15 m. wide, and has an area of 4,550 sq. m. Its dependent islands, which stretch away to Borneo, cover an additional 1,210 sq. m. Palawan is mountainous and well wooded and has a number of short, rapid rivers and excellent natural harbours. Resin and timber are exported.

In Japanese occupation since their conquest of the Philippines in May, 1942, Palawan was developed as an air base which controlled the Sulu sea and also the sea lanes between Japan and her conquests in S.E. Asia and the E. Indies. U.S. troops landed on the island March 1, 1945, and, meeting little opposition, seized Puerta Princesa, the chief town, and two airfields near by. Five survivors of a camp near Puerta Princesa, where 150 U.S. army

and navy prisoners had been held since the fall of Bataan, told how just before the U.S. landings the prisoners had been herded into a barracks which the Japanese had drenched with paraffin and set on fire, machine-gunning and bayoneting those who tried to break out. The R.A.A.F. had a base on Palawan in the last months of the Second Great War.

Palazzolo Acreide. Town of Italy, in Syracuse prov., S.E. Sicily. It is 27 m. W. of Syracuse city on the main road to Palermo. An ancient town founded by Greeks from Syracuse as Acorae in 664 B.C., it was later known as Placeolum, Balensul, and El-Akrat. Tombs of all periods, a small theatre of late Greek origin, and a temple of the dead occupy the old acropolis. Pop. est. 15,000.

Pale. In heraldry, a broad band, placed vertically, and occupying a third of the shield. It is



Pale, in heraldry

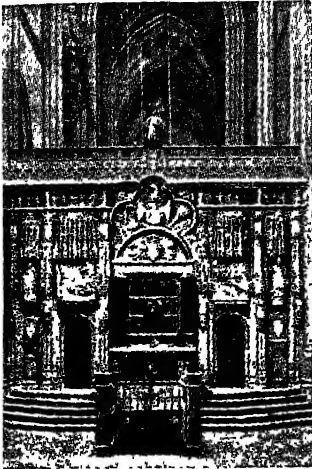
one of the ordinaries (*q.v.*). If a shield is divided down the middle by a vertical line it is said to be per pale. A shield divided by a number of vertical lines

is paly, the number of divisions being specified, but if there are two such lines the shield is described as tierced or tiercy. A row of charges placed one above the other are described as in pale. See Heraldry col. plate.

Pale (Lat. *palus*, stake). Term applied to that part of Ireland, in Dublin, Kildare, Meath, and Louth, where English law prevailed as opposed to the Celtic portion of the island. The Pale dated from the time of Henry II, though it did not bear the name until the 14th century. In the time of Henry VIII the boundary was formed by Dalkey, Tallaght, Kilcullen, Naas, Killocock, Sydan, Ardec, Derver, and Dundalk, but with the complete conquest of Ireland under Elizabeth the Pale disappeared. The term is now applied to any portion of a country whose inhabitants live under a different system of government from that of the country generally. "Outside (or beyond) the pale" is a figurative phrase. See Ireland.

Palembang. Town, river, and district of Sumatra, Indonesia. The town is 54 m. from the sea in the S.E. of the island; below the town the river, also called the Musi, flows through an extensive

area of marshland. The chief commercial centre of the island, it trades chiefly in coffee and pepper, particularly with Malays, Arabs, and Chinese, who reach the city by water. Many of the houses are



Palencia, Spain. Interior of the cathedral of S. Antolin, showing entrance, at foot of altar, to cave in which the saint lived

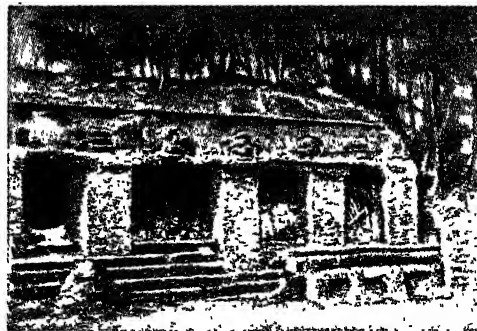
erected upon floating platforms. A fine mosque (1740) and an ancient palace are of interest. Much of the district is forest; here are oil wells and refineries. It became Dutch in 1825. The district has an area of 33,342 sq. m. and a pop. of 1,098,725. Town pop. 109,069. After the Japanese conquest of Netherlands Borneo during the Second Great War, some 700 parachute troops landed at Palembang, Feb. 14, 1942, followed the next day by sea-borne forces. There was fierce fighting round the town, which was captured by Japanese troops on Feb. 16, after the oil wells and refineries had been wrecked. Palembang was bombed on several occasions by Allied aircraft during the Japanese occupation, which continued until Sept., 1945, following the surrender of Japan.

Palencia. Prov. of Spain. It is in the N.W., S. of the Cantabrian Mts., from which many streams drain to the Pisuerga, which forms the N.E. boundary and crosses the S.E. of the province. The S.W. contains the marshy Laguna de la Nava in the Tierra de Campos. It formed part of Old Castile, and is scantily peopled. The N. is forested, and cereals, flax, wine, and oil are produced in the S. valleys. It manufactures rugs, paper, porcelain, and leather. Three rly. routes converge on the Pisuerga valley

close to the S. boundary. Area, 3,093 sq. m. Pop. est. 222,665.

Palencia. Walled city of Spain, the ancient Pallantia. It is the capital of Palencia prov. and stands on the Carrión river, 10 m. above its confluence with the Pisuerga, and on the E. edge of the treeless, wind-swept Tierra de Campos. The late Gothic and Renaissance cathedral was begun in 1321, and has a valuable collection of Flemish tapestries. The university, founded in 1208, was transferred to Salamanca in 1239. Shawls, blankets, chocolate, and bricks are manufactured. To the N.E. of the town is the Dominican convent of San Pablo, founded in the 15th century. The capital of the ancient Vaccaei, Palencia in the 12th century became the seat of the Castilian kings and of the Cortes. Pop. 19,540.

Palenque. Ancient city of Mexico. One of the centres of Maya civilization, its extensive ruins are near the village of Santo Domingo del Palenque in the state of Chiapas. Remains of a number of buildings have been found, and it is thought that many more exist in the surrounding forest-clad country, for evidently the city was of great size. Of the buildings the largest is called the palace; and the others were presumably temples. Of the palace the remains of the tower form a notable feature. More remarkable, perhaps, are the bas-reliefs, while other decorations are in the form of tinted reliefs in stucco. Another object of interest is an arched waterway, nearly 600 ft. long.



Palenque, Mexico. East front of one of the wings of the ancient Maya palace

Work on the ruins began in 1750. See *Maya*; Mexico; consult *Ancient Cities of Mexico*, W. H. Holmes, 1895.

Paléologue, MAURICE GEORGES (1859-1944). French diplomatist and historian, born in Paris, Jan. 13, 1859. Minister in Sofia 1909-13,

he was then ambassador in St. Petersburg until the revolution of 1917, and later permanent under-secretary of the French Foreign office. As biographer of de Vigny, Talleyrand, and Metternich, and with his own memoirs, he won fame and was elected to the Academy in 1928. He died Nov. 21, 1944.

Palermo. Prov. of Italy, in N. Sicily. It is hilly, the Madonia Mts. culminating in Monte San Salvatore, 6,267 ft. Rlys. run from the city of Palermo in both directions along the coast, and S.W. and S.E. across the prov. Sulphur, marble, wines, figs, lemons, oranges, and olives are the chief products. There was fighting in the prov. as a result of Garibaldi's expedition in 1860.

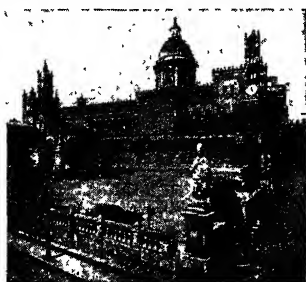
Palermo. Seaport and sixth city of Italy, capital of Sicily. On the N. coast of the island on the W. of the Bay of Palermo, surrounded by the fertile plain, the Conca d'Oro, it is backed by an amphitheatre of mountains, the chief heights of which are Monte Pellegrino and Monte Calfano. The town is built in a quadrangle, with the E. side on the sea. The ruined fort of Castellamare adjoins the water. The cathedral, built by Archbishop Walter in the 12th century, contains imperial and other monuments.

Many of the famous buildings were Norman of the 12th century. The character of the city was not seriously changed by Allied bombing of the Second Great War, though doors, windows, and roofs were damaged, two churches were destroyed, and the national library was badly damaged. The royal palace, begun by the Saracens, with additions by the Norman rulers, had already been

so altered that there are few traces of original work. It contains the Cappella Palatina, built by Roger II in 1143, reputed to be the most beautiful palace chapel in the world, with mosaics and carved roof. The churches of San Salvatore, San Giovanni degli Eremiti,



Palermo arms



Palermo. The Piazza del Duomo and the 18th century cathedral

La Martorana, and San Domenico, the 16th century archbishop's palace, the university (1805), observatory, and the national museum (seriously damaged) are notable. Fishing, boatbuilding, and ironworking are among the industries. Pop. 452,417.

The city, founded by the Phoenicians, was called by the Greeks Panormos, and became a Carthaginian stronghold, which was seized by the Romans in 254 B.C. It remained Roman until its capture by the Ostrogoths, from whom it was taken by Belisarius in 535. It fell into Saracen hands in 830, but in 1072 was taken by the Normans. Palermo was the scene of the

Sicilian Vespers (*q.v.*), 1282, which ended the Norman rule. A possession of Spain and the allied Bourbon house of Naples, the city vainly tried to cast off its thralldom, and as late as 1848 and 1860 was bombarded by its own sovereign, Ferdinand II, thereafter known as Bomba. It was captured by Garibaldi, May 27, 1860. It was occupied by units of the U.S. 7th army, July 22, 1943, against negligible opposition from Germans and Italians. See Byzantine Art.

Palermo Stone. Inscribed black granite slab in the Palermo museum, Sicily. Erected in Lower Egypt during the Vth or VIth dynasty, it is engraved with linear hieroglyphs, of which the beginning and end of each line have disappeared. A brief list of independent predynastic kings in Lower Egypt before Mena is followed by a record of the main event in every year during the reigns of early kings of united Egypt down to the Vth dynasty. The annals mention the foundation of towns, endowment of temples, erection of statues, wars and expeditions, biennial census returns, religious festivals, and the height of the Nile.

PALESTINE: THE TRAGIC HOLY LAND

Basil Mathews, M.A., (Oxon.), E. Stern-Rubarth, Ph.D., and others

This account of Palestine includes a review of its history from the invasion of the Egyptian kings to the British conquest of 1918 and the surrender of the British mandate in 1948. For later information see Novissima Verba at the end of the Encyclopædia.

See also Crusades; Jerusalem; Jews, etc.

From 1920 to 1948 the historic name of Palestine was borne by a country at the S.E. extremity of the Mediterranean Sea on the edge of Asia. It stretched between latitudes 29° 30' and 33° 15' N., with an average E. to W. width between coast and desert of 100 m. To the N. the geographical line dividing it from Syria was somewhat loosely drawn in 1920, but included within Palestine the Jewish colony of Metulla. To the E. the country was bounded by Transjordan, the river Jordan forming for all practical purposes a dividing line, which also ran through the middle of the Dead Sea. Across the S. boundary was the Egyptian province of Sinai. The area of Palestine was 10,150 sq. m.

The whole length is divided into four natural geographical strips running S. to N. in roughly parallel lines. Taking a transverse section of them, W. to E., they are: (1) the seashore; (2) the coastal plain, broken here and there by the jutting masses of (3) the hills of Judæa,

Samaria, Galilee, and Lebanon; (4) the Ghor, the rift of the Jordan valley, 1,300 ft. below the level of the Mediterranean where the river runs into the Dead Sea.

The climate is as varied as the build of the land. Roughly, it has four divisions: the coast, the hills, the Jordan valley, the desert on the E. The W. wind from the sea predominates; its characteristic is humidity. The E. wind from the desert, dry and exhilarating in the winter, is, in the summer, extremely hot and loads the air with dust. It is fortunately infrequent, except during mid-winter. There are welcome sea breezes on the coast. The climate is in general terms subtropical, with two seasons, a rainy winter, mid-October to early May, and a dry, hot summer. Palestine is a half-way house between the heavy Lebanon rainfall of Northern Syria and the almost rainless Egypt. Winter temps. vary within wide limits; in the coastal region 90° F. has been recorded, and in the Jordanian highlands temps.

below freezing point. Summer temps. are everywhere high.

The population, in 1947, was about 1,900,000 (exact figures unavailable, owing to illegal immigration, and to the movement of Arabs from and to the surrounding countries), as against 757,182 at Palestine's first census in 1922. The Jewish population grew in the same period from 83,749 to more than 608,000, the Muslim Arabs from roughly 600,000 to 1,143,000, and the Christians from 73,024 to about 145,000.

This remarkable development is due to three facts: (1) the Zionist movement, especially since the Basle congress of 1897 and under Dr. Theodore Herzl's leadership; (2) the Balfour Declaration (*q.v.*) of 1917 which promised the establishment in Palestine of a national home for the Jewish people; (3) the persecution of European Jews under the Nazi regime. Consequently, the number of Jews in Palestine increased by about 240 p.c.—compared with the last Turkish figures (1918) by 1,100 p.c.—while that of the Arabs grew by only about 20 p.c. This increase was achieved in the face of several legal and technical steps taken by the British mandatory authorities to curtail immigration and by a whole system of measures to prevent the illegal influx of Jewish settlers from the different countries that were, between 1938 and 1945, overrun by the Nazis.

The former division of Palestine's population into town dwellers, settled village peasants (fellahin), and nomadic Beduin tribes (hadari), does not hold good any more. The European Jews brought with them higher technical and scientific knowledge, as well as considerable capital, mainly contributed by co-religionists in Europe and America, and they soon developed not only scientific farming and gardening on the Californian pattern, but also a remarkable and widespread industry, constructing new towns, of which Tel Aviv, an entirely Jewish city N. of Jaffa, founded as a small settlement in 1907 and now with a pop. of over 180,000, is the outstanding example.

ARCHAEOLOGY. The material remains of the human occupation of Palestine recorded and unearthed since 1870 by the Palestine exploration fund and other organizations have greatly elucidated and extended biblical history. Many thousands of worked flints attest the presence of upland hunting communities at the Palaeolithic, and perhaps even the Eolithic, level

of culture; and in 1925 part of a Neanderthal skull was found in a Galilean cave.

Early Neolithic implements, still more abundant, come chiefly from the lower lands, better suited for primitive tillage and herding, on both Jordan banks, the Shephelah tells, and the coastlands. They include spear-heads, arrow-heads, saws, chisels, sickle-points, polished axes, millstones, and boneware.

During the 3rd millennium B.C. immigrant waves of nomad Semites began to overrun the aboriginal settlements, aided by an advanced culture showing familiarity, direct or indirect, with Egyptian metal-working and the potter's wheel. It was apparently during this early Semitic or Amorite period, marked by the overlap of stone and metal, that there came into the southlands, from Moab across to the maritime plain, taller, stronger peoples, the Biblical Rephaim and Anakim, to whom are ascribable the Megalithic dolmens, menhirs, and stone-circles which abound.

Early Semitic Remains

The pre-Israelite, Bronze Age, civilization of Canaan, revealed by excavations at Gezer, Megiddo, and Taanach, shows from the outset the characteristic forms of early Semitic worship, marked by high-places, mazzebas, and asheras or sacred posts. It exhibits also the Semitic incapacity for creative art, the indigenous crafts being based upon imported models and ideas, with indifferent workmanship. It is a period of strong walled towns, one of them being the Jebusite stronghold excavated on Mt. Ophel at Jerusalem.

The Israelitish tribes appear to have infiltrated gradually into Palestine from the 14th century B.C.; records of inroads by nomads are preserved in the tablets found at El Amarna in Egypt, and a number of towns, including Jericho, bear evidence of destruction at this period. In the 12th century B.C. coastland sites show the intrusion of an alien people from the Aegean. These are the Philistines, probably originally from Caria, fugitives from the break-up of the Cretan-Mycenaean world, and their coming ushers in the Iron Age. Traces of them are found at Gezer, Gerar, and elsewhere, after which there is a period of Hebrew domination, which lasts until the Assyrian invasion. One of the chief finds of the Hebrew period is the palace of Ahab at Samaria; while from across the Jordan, in Moab, comes the celebrated Moabite stone, found 1868 now in the Louvre,

with an inscription of c. 850 B.C. recording the defeat of the king of Israel by Mesha king of Moab.

To the general Hellenistic stream which followed upon the break-up of Alexander's empire are attributable the edifices erected before and during the time of Christ, as illustrated by the excavations at Tiberias and Capernaum.

one empire; about 2500 B.C. the Egyptian kings crossed the Sinai peninsula and the desert, broke through Gaza and Beersheba, and held Palestine. A thousand years later an account by Thothmes III of his invasion forms the first piece of detailed historic record; Canaanites occupied the land. Thothmes marched across the desert via Gaza

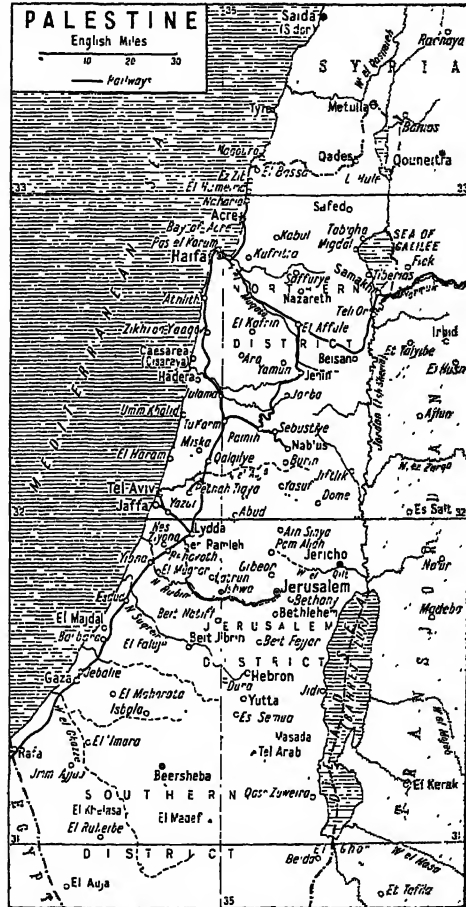
up the coastal plain to Carmel, and thence across the hills to Megiddo, where he defeated the Canaanites. Driven back a century later from Syria by the Hittites, Egypt still held Palestine loosely. About 1200 B.C., by a treaty between the Hittites and Egyptians, Palestine fell to Egypt and Syria to the Hittites.

A series of tidal waves of immigration about this time brought (a) Arameans from Arabia, whose language was used for more than 1,000 years in many parts; (b) Khabiri from Arabia; (c) Philistines from over the sea, and last, but most important, (d) Hebrews from the Southern desert.

For 150-200 years the Hebrews acknowledged no central authority; they warred against the Canaanites, and against the border Beduin

peoples. During this period, that of Judges, there was "no king in Israel."

About 1100 B.C. the Philistines mastered Palestine across to the Jordan. The Hebrews, fused with the Canaanites by this common affliction, revolted against the Philistines. They felt the need of central authority and unity. The period of "kings" began. Under Saul the ridge of hills was freed as far as Gilboa. David drove the Philistines right down to the coastal plain, united



Palestine. Map showing the chief cities and ports of this country as it was 1920-48

The building activity of Herod the Great is represented by the substructures of his temple, his aqueducts, and reservoirs at Jerusalem, his palace, porticoed streets, and hippodrome at Samaria, his basilica at Ascalon. Substantial examples of later influences have been found, notably Byzantine churches, Arab strongholds, and Crusader castles, associated with pottery, glass, terracotta, metalwork, and other forms of craftwork.

HISTORY. About 3300 B.C. the Nile cities and villages became

Palestine, centralised government in Jerusalem, and smote the desert tribes across Jordan eastwards, even as far N. as Damascus. The Philistines and the Phoenicians on the coast remained independent.

This was the greatest rule ever exercised in all history by and from Palestine itself. There was rapid decline of power under Solomon. After his death the kingdom was divided into Judah (roughly, Palestine) and Ephraim (roughly, Syria). From the 9th to the 6th cent. B.C., Assyria and Babylonia in their expansions and in their conflicts with one another and with Egypt continually won and lost and re-won the control of Palestine. Judah rebelled sporadically against the successive imperial tyrannies. Often the rebellion (e.g. against Assyria) was fomented by a rival power (e.g. Egypt). Yet Judah never secured real freedom; and the kingdom was destroyed in 586 B.C.

Outstanding and dramatic events in this kaleidoscope of conflict between empires over the Palestinian hills were: (a) the amazing escape of Judah in 701 B.C., when the Egyptians were defeated near Ekron, and Sennacherib's stupendous forces, which threatened to engulf the tiny kingdom, were defied in immortal scorn by Isaiah (Isaiah 10), and were swept out of existence (probably by pestilence) on the Philistine plain; (b) the Egyptian victory on the plain of Megiddo (607 B.C.), with the death of King Josiah of Judah, followed swiftly by the counter-defeat of the Egyptians by Nebuchadnezzar; and (c) the deportations of the Hebrews from Palestine to Babylon (usually called the exile).

End of the Exile

From the 6th century to the 4th, Persia, which under Cyrus captured Babylon in 539 B.C., took command of the provinces of Babylon, including Palestine, and set the exiles in Babylon free to go back and rebuild Jerusalem. Alexander the Great in turn overcame the Persian empire (333 B.C. onwards), and after his death and the division of his empire Palestine fell to Egypt and the dynasty of the Ptolemies, who fought the Seleucids controlling N. Syria across the prostrate body of Palestine. As these powers were enfeebled by the blows of Rome, the Jews, thrilled with patriotic and religious zeal, rose in revolt. The Maccabean family led them, 168 B.C., and the Jews won complete freedom in 143 B.C.

During these centuries of conflict and exile, ideas and ideals were wrought out, personalities sprang up, and literature was written which made Palestine of greater historical importance than even the vast empires of Babylon, Assyria, and Egypt. The little city of Jerusalem could have been hidden within the walls of one palace of Nebuchadnezzar, and it was repeatedly reduced to ruin. The hills of Judea were not much larger than Sussex, and they were hardly ever free from tyranny. But, robbed of all material power and of external freedom, the people received the conception of one almighty, invisible, wise Creator—God, who was also Shepherd; and the ideal of theocracy, omnipotent over all human rule, a rule of God to whom even the all-highest of Assyrian "frightfulness," Sennacherib, was—as Isaiah said—an axe or a wooden staff, the merest tool of the invisible King, who was to bring in His kingdom "under a Prince of Peace." Those new conceptions made Palestine the source directly of two of the great monotheistic religions of the world, Judaism and Christianity, and indirectly of the third, Islam.

The Roman Province

A new era began when Alexander the Great had swung Palestine out of the Asiatic into the Greek orbit of thought; an absolutely new world of original ideas. The centre of gravity of world history swung from E. to W., from Asia to Europe. Rome, fully armed, leapt into the Near East. The Maccabees had shared Palestine with an Arab tribe, the Nabateans. In 64 B.C. Pompey invaded the land, and in the following year reduced Jerusalem after a three months' siege. The *Pax Romana* now covered Palestine, but Herod the Great, as a prince under Rome, held Jerusalem through a five months' siege in 37 B.C.

Then in Palestine Jesus Christ was born, lived, and was crucified; and His followers proclaimed His Gospel. It was the Roman peace and the Roman roads that made the paths open for the rapid spread of the Christian faith from Palestine through the Empire.

The Jews still made political trouble in Palestine. In A.D. 70 Jerusalem was practically destroyed after a long siege. After the revolt of A.D. 132-5 Jerusalem was made a Roman colony. Through six centuries the Roman Empire held Palestine with a gradually relaxing grasp.

Then suddenly, out of Arabia, the scimitar of Islam swept, and in A.D. 635 the fall of Damascus yielded Palestine to Mahomedan rule. A fight of Heraclius against the Arabs on Aug. 20, 636, ended in his defeat. It was one of the decisive battles of the world's history, as it meant the clinching of the power of Islam. From the 7th till the 11th century Palestine was ruled by the Caliphs; and in the 11th century the Turks, coming from the N., became dominant.

The next period, that of the Crusades, 12th-13th centuries, is an involved and complicated story which ended in leaving the Turkish power still dominant over Palestine. Latin colonies in Palestine persisted after the Crusades proper were over.

A new terror swept down from the N. in the 13th century, in the shape of the Tartars, and the Mameluke or Tartar sultans ruled till the Ottoman Turks, in the 16th century, gained the upper hand and ruled Palestine continuously thereafter until defeated and dispossessed in 1918. The rule was similar to that all over the Turkish Empire. The population decreased. No progressive movements took place. In 1799 Napoleon invaded the country, mainly to defend Egypt. He failed to secure any real hold, though he crippled Turkish resources. Again, in 1831, Egypt, under Ibrahim Pasha, invaded Palestine and occupied it till 1840.

The First Great War

When Turkey became a belligerent in the First Great War, the safeguarding of the Suez Canal became a major preoccupation of British strategy. Attacks on the canal in Feb. and March, 1915, were defeated by the British, and plans were drawn up by Sir A. Murray, c-in-c. of the Egyptian Expeditionary Force, to drive the Turks out of the peninsula of Sinai. The R.E.s began to build a rly. from the canal eastward towards Palestine. In April, 1916, the Turks, based on El Arish, suddenly attacked at Katia, but without effect, being themselves completely beaten in further fighting at Romani in Aug. In Dec., Murray occupied El Arish, and moved on to Rafah on the Palestine frontier, defeating the Turks here Jan. 9, 1917. Advancing into Palestine the British advanced towards Gaza, which they twice attempted to capture, without success. Murray was then replaced by Allenby who did not renew the offensive until after several months of inten-

sive preparation, during which time the Turks had greatly strengthened a front stretching from Gaza to Beersheba.

On Oct. 27, 1917, Allenby opened a land and sea bombardment of Gaza, but his main attack was on Beersheba, captured Oct. 31. He then proceeded to roll up the Turkish front from that side. Gaza fell on Nov. 7, and Allenby pushed N. without delay. Winning a considerable victory at El Maghar, Nov. 13, he held by the following day the junction of the Central Palestine and Jerusalem rlys. To make his left secure before advancing towards Jerusalem, he captured Jaffa, Nov. 17, then advanced from Er Ramle through the Judean hills towards Jerusalem, his engineers making the roads and the rly. required for this move.

The British right flank occupied Hebron on Dec. 6, and by nightfall two days later Allenby's men were only $1\frac{1}{2}$ m. from Jerusalem. On the morning of Dec. 9, it was found that the Turks had evacuated the city, and at about noon it was formally surrendered by the mayor. Allenby made his official entry on foot, Dec. 11.

End of Allenby's Conquest.

But the Turks were only 4 m. distant, N. and E., and it was necessary for the whole British line, now about 50 m. long to the sea, to be consolidated. The Turks attacked with the object of retaking Jerusalem, but were beaten back on Dec. 28. Allenby then resumed a general assault which resulted next day in a total Turkish defeat. Advancing again, the British took Jericho, Feb. 21, 1918. During subsequent months, however, the desperate British situation on the Western Front led to serious depletion of Allenby's forces, and he was given replacements from Indian troops. This delayed his final offensive until Sept., 1918. Between Sept. 19 and 24 the Turkish armies were routed and destroyed. Arabs to the N. had occupied Deraa and intercepted the Turkish retreat, and by Sept. 29, British and Arabs were advancing towards Damascus, and the conquest of Palestine, E. of the Jordan, was complete. Turkish prisoners taken in the final offensive numbered 60,000.

Palestine remained under British military administration until July, 1920, when a civil administration was set up under a British high commissioner, appointed by the crown.

From then until May, 1948, Great Britain continued to administer

the country as mandated territory under the League of Nations, according to a constitution of Sept. 1, 1922, amended May 4, 1923, and put into force Sept. 29, 1923. This established the British high commissioner, who was simultaneously supreme commander and head of the executive council of three, assisted by an advisory council, which, because of persistent Arab refusal to participate in its election, replaced the legislative council of 10 appointed and 12 elected members provided for in the constitution. The first high commissioner, 1920-25, was Sir Herbert (later Viscount) Samuel; the last, Nov., 1945-May, 1948, was Sir A. G. Cunningham.

Palestine under Mandate.

This administration resembled that of a British crown colony and introduced many legal and social institutions on the British pattern, although Turkish civil law, largely based on the French, remained in force. Moreover, the Jewish and other religious communities possessed far reaching autonomy in education, employment, and labour policy, social services, and in respect of marriage and inheritance laws. For the Jewish community these powers were vested in the Jewish Agency; there was a Jewish Federation of Labour, Histradruth; a Labour Party, Mapai (abbr.); and a smaller, left-radical group, "Young Watchmen." Unofficially, a Jewish defence force, Haganah, was built up and equipped and trained with mostly smuggled arms; in 1947 its strength was estimated at 80,000-100,000.

The promises made variously to Arabs and Jews during the First Great War and at other times, being interpreted differently by both communities, led to severe clashes from the beginning. The Arabs, for example, interpret a 1915-16 correspondence between Sir H. MacMahon, then high commissioner of Egypt, and Emir Hussein of Mecca, later king of Hedjaz, acting as spokesman of all Arab communities, as having granted them independent rights in all Arab countries, including Palestine. The Jews claim sovereign rights on the strength of the Balfour Declaration which was embodied in the mandate entrusted to the U.K. Both claim Palestine as their Promised Land; and as neither could get full satisfaction, they resorted to force.

Strikes, then Arab revolts, against the continued Jewish immigration took place in 1929, and

during 1936-38. They were suppressed by British forces, with considerable damage and bloodshed. Great efforts were made, however, to bring about a conciliation. White papers defining British policy were published 1922, 1936, 1939, and July, 1946. Finally, a royal commission (the Peel commission) of 1937 recommended a partition of the country between Jews and Arabs. Resisted by both sides, this proposal was investigated afresh by the Woodhead mission of 1938, and was given up as impracticable. A London round-table conference, 1939, produced a scheme for the independence of Palestine within 10 years, all Jewish immigration after 1944 to be dependent upon Arab consent.

The Second Great War interrupted these attempts at overcoming the real Arab grievance: that a continued Jewish immigration, though beneficial materially and otherwise for Arabs, would abolish the Arab character of what for them is also a Holy Land.

The Second Great War.

At the outset of the Second Great War, Jews and Arabs in Palestine temporarily composed their differences, but because of its status as mandated territory, Palestine could not be formally at war. Some hundreds of Palestinians, mostly Jews, were recruited for service in the Auxiliary Military Pioneer Corps, and companies served with the B.E.F. in France in 1940. On June 10, 1940, however, the British govt. issued a decree empowering the high commissioner to place Palestine on a war footing and to mobilise the country's resources. Coastal defences were permanently manned, fifth column activities suppressed, and a black-out imposed in Jerusalem. Haifa became one of the two contraband control bases for the Mediterranean area and a refuelling base for Allied warships. On July 15 the Italians bombed Haifa; a few days later they attacked Tel Aviv.

In June, 1941, Palestine became the base for the British and Free French forces in their drive upon Syria. As a consequence, the country experienced a number of raids by German and Vichy bombers. While the Mediterranean remained virtually closed to British shipping, Palestine became a highly important base for British troops operating in N. Africa. Thousands of troops received pre-combat training there, and for the supply of these forces the country underwent consider-

able development; many engineering and chemical articles not previously manufactured in Palestine were produced on a large scale.

In Aug., 1942, the British gov. compromised with a Jewish demand for a Palestine army by authorising the raising of the Palestine Regiment (*q.v.*). Later, Jewish and Arab commando units did valuable service against Axis-held islands in the Mediterranean. Some 50,000 Palestinians, Arab and Jew, served with the British forces in N. Africa, Abyssinia, and Greece. Some 1,500 Palestinians, mostly Jews, were taken prisoner during the British evacuations of Greece and Crete. After the expulsion of the Axis forces from N. Africa, Palestine continued to be of military importance as a base and supply centre, and a training ground for troops destined for Italy. Rest and convalescent camps were also established there.

After the war, armed clashes, bomb outrages, and assassinations, often the work of Jewish terrorist organizations such as "Irgun Zvi Leumi" and the "Stern Gang," reduced the chances of peaceful settlement almost to nothing; and the Arab League, embracing Egypt, Saudi-Arabia, Iraq, etc., and backed by Indian Muslims, was set up in March, 1945. An Anglo-American committee investigated the situation; its report, April 20, 1946, and the results of a special meeting of the United Nations, April-May, 1947, upon a British application, led to a U.N. inquiry into Palestine. The U.N. report, Sept. 1, 1947, again recommended partition, with Jerusalem as an autonomous city. Both parties once more protested against this proposal and reacted with more acts of violence which cost numerous British lives.

Thereupon the U.K. announced to the U.N. on Sept. 26, 1947, her decision to give up her mandate by May 15, 1948, and to withdraw all her forces by Aug. 1, leaving it to the U.N. to implement the partition plan (accepted Nov. 29, 1947). Even as the British began to leave, violent and bitter clashes broke out between Jewish and Arab forces, communication with the rest of the world was severely restricted, and world-wide concern was expressed for the material safety of the holy places of Jerusalem and elsewhere. There were efforts made, in which the U.S.A. took a leading part, to establish a truce between the opponents. But on the very day the mandate expired the Jewish

Agency claimed the existence of a Jewish state under the name of Israel. Within a few hours Arab forces from Lebanon, Transjordan, and Egypt had invaded the country from N., E., and S. respectively, and full-scale warfare appeared inevitable. (See *Novissima Verba* at the end of this Encyclopedia.)

Jewish immigration into Palestine had raised enormously the country's production, agricultural as well as industrial, its land values, and its educational, hy-



PALESTINE. Map illustrating the United Nations proposals of Nov., 1947, for the partition of the country into Jewish and Arab states

gienic, and general living standards, for the Arab working population as well as for the Jewish and Christian ones. Wages were from twice to three times those in neighbouring Arab countries, while the cost of living exceeded theirs by from 8-15 p.c. only. Between 1921 and 1947 the number of industrial enterprises rose from 1,749 (with 4,434 employees) to about 7,000 (with 60,000), with new capital investment of about £30 million. Palestine's exports in 1946 were valued at £24,485,000, its imports at £70,432,000, the difference mainly representing new capital investment from abroad.

A special fund, established 1901, purchased land as the national property of the Jews, leasing it to

settlers, while another, established 1920, financed the development of villages and collective farm communities and granted subsidies and redeemable long-term loans. Important industrial concerns include the Palestine Potash Syndicate, of British foundation, exploiting the mineral wealth of the Dead Sea, and the Palestine Electric Corp. (Rutenberg concession) of 1921, producing 92 p.c. of the country's electric current, mainly with Jordan and Yarmuk water power. There is a large oil refinery at Haifa where the Iraq Petroleum co.'s pipe-line ends, and there are textile, mills, engineering and instrument-making plants, and those producing cement and bricks. A great deal of industry is related to agriculture: canning, vegetable oil extraction, baking, manufacture of agricultural machinery, etc.

Agriculture itself, relying on scientific irrigation, fertilisation, and soil redemption, produces wheat, barley, durrah, sesam, melons, bananas and, above all, citrus fruits. Between 1938 and 1948, 15-20 million boxes of 100-160 oranges, and 95-125 grapefruit were exported annually. Total combined port traffic for 1939 of Haifa, Jaffa, and Tel Aviv amounted to 4,411,631 tons.

These three cities, with Jerusalem, are the largest centres of population. There are 445 miles of rly., and 1,717 m. of motor roads. The main airport is at Lydda, 10 m. S.E. of Jaffa.

Bibliography. Handbook of Palestine and Transjordan, Sir H. Luke and E. Keith-Roach, 1930; History of Palestine and Syria, A. T. Olmstead, 1931; History of Palestine, A. S. Rappoport, 1931; The Holy Land under Mandate, F. Andrews, 2 vols., 1931; Historical Geography of the Holy Land, Sir G. A. Smith (25th edn.), 1931; The Arab Awakening, G. Antonius, 1938; Judeaea Lives Again, N. Bentwich, 1944.

Palestine. A city of Texas, U.S.A., the co. seat of Anderson co. It is 160 m. by rly. N. of Houston. There are rly. shops, and its industries include the manufacture of cotton, lumber products, cotton-seed oil, furniture, and bottles. Situated between the Trinity and Neckes rivers, it ships cotton, maize, fruit, and vegetables from the surrounding country. The Palestine salt dome is a geological wonder, 30,000 ft. in diameter. Settled 1837, it became a city in 1875. Pop. 12,144.

Palestine Exploration Fund. British archaeological organization. Founded in London, 1865, it

carries on excavations in Palestine. Originally the society's activity was chiefly directed towards unearthing biblical sites, and publishing its results. A number of special enterprises have been organized. In 1865-66 Captain Wilson led the first expedition to determine the places and sites to be investigated, and a similar one was commanded by Lieut. (later Sir) Charles Warren, 1867-70. An important survey of western Palestine was undertaken in 1872-77. In 1881 Captain Conder surveyed a part of E. Palestine; in 1890-93 work was carried out at the buried cities of Tel-el-Hesi, in which Flinders Petrie and F. J. Bliss took part. Later special excavations were conducted in the south wall of Jerusalem, the ruins of Gath, Gezer, Beth-Shemesh, Ascalon, and Samaria, and many other sites. Work was carried on after 1920 in conjunction with the British school of archaeology at Jerusalem.

The society has organized the making of large scale maps, and issues the Palestine Exploration Quarterly; its library is at its h.q., 2, Hinde Street, Manchester Square, London. *See* Archaeology.

Palestine Police. Former British police force. Established in 1923 when the League of Nations gave the U.K. the mandate over Palestine, the force was recruited from Britons, Arabs, and Jews; the British element, recruited in the U.K., numbered some 4,000 out of a total of 16,000. Although armed and equipped to army scale, the force was a strictly civilian organization. During the Second Great War it was incorporated into the Palestine garrison. The Arab disorders of 1936-39 and the Jewish terrorist campaign after the Second Great War caused severe casualties to the force, particularly amongst its British element. Discipline in the force was high amongst all three nationalities, and Jew and Arab personnel invariably remained loyal in periods of acute inter-racial strife. The Palestine Police was disbanded on May 15, 1948, when Britain relinquished the Palestine mandate.

Palestine Regiment. Former regt. of the British army. Authorized in Aug., 1942, it was raised and expanded from Jewish and Arab companies of the Royal West Kent regt., which in 1941 had opened its ranks to Palestinians. The Palestine regt. eventually had a strength of 10,000, divided into one Arab and three Jewish battalions.

Originally raised for service in and near Palestine, it later fought in N. Africa and Italy. In Italy it formed part of the Jewish bde. of the 8th Indian div., and earned particular distinction at the crossing of the Senio river, April 10, 1945. The regt. was disbanded at the end of the Second Great War.

Palestrina. City of Italy, in the prov. of Rome. It is 23 m. E.S.E. of the capital, and occupies the site of the Roman city of Praeneste. The modern town, with steep streets, is picturesquely situated on a hillside, and is almost entirely built over the ruins of a vast temple of Fortuna, which graced the Roman city.

Praeneste or Palestrina came in the Middle Ages into the possession of the Colonna family, but in 1298 during a war with the pope it was destroyed, as it was again, after it had been rebuilt, by the pope's troops in 1448. The Colonnas again restored it, and from them it passed to the Barberini family. There are remains of the castle of the Colonnas, and of the citadel, while the palace of the Barberini still stands. In the latter are some objects of art found in the neighbourhood. The cathedral is modern, and was badly damaged in the Second Great War, as was the temple of Fortuna. Other Roman remains include walls and a villa. *See* Praeneste.

Palestrina, GIOVANNI PIERLUIGI DA (1524-94). Italian composer. Born at Palestrina, from which he took his name, he studied in Rome about 1540, and, returning to his native town, was canon and organist there from 1544 until 1551 when he



G. P. da Palestrina,
Italian composer

was made master of music at the Vatican. On the accession of Paul IV, in 1555, he lost his post, but soon filled a similar one at S. John Lateran. He moved in 1558 to S. Maria Maggiore, and in 1571 returned to the Vatican, to remain there until his death, Feb. 2, 1594.

Palestrina was the greatest master of polyphonic music who ever lived. His famous 15 books of masses represent the perfect type for vocal music in the modal style, and are landmarks in the history of religious music, especially perhaps the one he composed for Pope Marcellus II. The simplicity and dignity of his music has influ-

enced composers of the 20th century more than those of any period since his own. Palestrina composed over 250 motets, some madrigals, and made 29 settings of the Song of Solomon. A study by H. Coates appeared in 1938.

Palestro. Village of N. Italy. It is in Pavia prov., near Vercelli, 34 m. W.S.W. of Milan. The village was the scene of heavy fighting between the Austrians and allied French and Sardinians, May 30-31, 1859. The brunt of the battle fell on the Sardinian troops, a division of whom were led into action by Victor Emmanuel, whose bravery was so conspicuous that a French regiment elected him their corporal. The Austrians were routed with a loss of 1,500, and began the retreat which led to Magenta and Solferino.

Paley, WILLIAM (1743-1805). British theologian. Born at Peterborough, the son of a schoolmaster, he was educated at Giggleswick and Christ's College, Cambridge, becoming senior wrangler, tutor, and lecturer in the university. In 1776 he took a living in Westmorland; in



Mr. Paley

1782 he was made archdeacon of Carlisle, and later rector of Bishop Wearmouth. He died at Lincoln, where he was sub-dean, May 25, 1805, but was buried in Carlisle cathedral. Paley's writings include *Principles of Moral and Political Philosophy*, 1785, a standard work; the popular *Evidences of Christianity*, 1794; *Natural Theology*, 1802. *Consult* Works, new ed. 1838; *Life*, G. W. Meadley, 1809.

Palghat. Town of Madras state, India, in the Malabar dist. It is situated at the W. end of the Palghat Gap on the main Madras-Calicut rly. Pop. 55,160.

Palghat Gap. Outstanding physical feature of the Deccan, India. The Deccan plateau is edged by the escarpments of the E. and W. Ghats which join in the Nilgiri Hills. The S. face of the Nilgiris comprises a scarp as steep as the seaward face of the W. Ghats. The S. Deccan consists of a continuation of the W. Ghats. Between these heights and the Nilgiris is a wide gap, the Palghat, which is the one large break in the W. escarpment, and is the only easy route of communication

between the Malabar and Coromandel coasts. It is 20 m. wide and just over 1,000 ft. high, and carries the main rly. line from Madras to Calicut.

Palgrave, Sir Francis (1788–1861). British historian. Son of Meyer Cohen, a Jew, he was a



Sir Francis Palgrave
British historian
After G. Richmond, R.A.

Londoner. He married Elizabeth Turner, adopted her mother's name of Palgrave, and embraced Christianity in 1823. Called to the bar at Middle Temple in 1827, he was knighted in 1832, was deputy keeper of the public records, 1836–61, and did much to promote the study of medieval history. He died at Hampstead, July 6, 1861. He wrote *The Rise and Progress of the English Commonwealth*, 1832; *Truths and Fictions of the Middle Ages*, 1837; *History of Normandy and England*, 4 vols., 1851–64.

Of Palgrave's four talented sons, the eldest, F. T., is noticed below. William Gifford (1826–88) was a missionary who in 1862–63 crossed Central Arabia disguised as a Syrian and a diplomatist who ended as British minister to Uruguay, where he died. Sir Robert Marny Inglis (1827–1919) edited *The Economist*, 1877–83, and *Dictionary of Political Economy*, 1894–1914. Sir Reginald (1829–1904) was clerk to the house of commons 1886–1900.

Palgrave, Francis Turner (1824–97). British poet and critic. Born in London, Sept. 23, 1824, eldest son of the above Sir Francis Palgrave, he was educated at the Charterhouse and Balliol College, Oxford. He joined the education department in 1849, and after his retirement was in 1886 appointed professor of poetry at Oxford. He died Oct. 25, 1897. His fame rests chiefly on the work he did as editor of poetical anthologies above all *The Golden Treasury of English Lyrics*, 1861–97 (many edns.). *Landscape in Poetry*, 1897, is a critical work.

Pali (canon). One of the oldest popular dialects of India. It is the language of the sacred books

of the Buddhists, who themselves call it Magadhi, the language of Magadha, where Buddha preached in it. The Pali characters are akin to those of Sanskrit, from which it is derived. Its extensive literature includes Tipitaka (the three baskets), the Buddhist scriptures; the commentaries on them; the Questions of Menander, a religious discussion with a Bactrian king; and two valuable chronicles of Ceylon.

Palimpsest (Gr. *palimpsestos*, rubbed again). Ancient manuscript whose writing has been imperfectly effaced and its material re-used. Vellum was washed and rubbed, papyrus was sponged. The Codex Ephraemi in Paris, a 5th century Greek Biblical text, was overwritten in the 12th century with the works of Ephraem Syrus. Examples of double palimpsests are known. The term is loosely used for monumental brasses and stone slabs, re-used on the back without erasure of the front. It is applied also to re-worked flint implements, regarded as archaeological documents. See Manuscript; Palaeography.

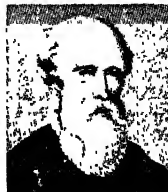
Palindrome (Gr. *palindromos*, running backwards). Word or sentence which reads the same forwards or backwards. An example is the saying put in the mouth of Napoleon, "Able was I ere I saw Elba."

Palingenesis (Gr. *palin*, again; *genesis*, birth). Metaphorically, the regeneration of anything old, such as institutions or mankind as a whole. Philosophically, the theory that all living beings, animals as well as men, will be born again to a more perfect state. Biologically, the reproduction of ancestral characteristics without any change, as opposed to cenogenesis.

Palinode (Gr. *palin*, contrariwise; *ōdē*, song). Ode in which the poet retracts the substance of an earlier poem, a recantation. Stesichorus (fl. c. 610 B.C.) wrote a palinode recanting an attack on Helen, and Horace, *Od.* i, 16, retracts the hasty iambic diatribes he launched against Canidia in his 5th and 17th Epodes charging her with sorcery. See Ode; Poetry.

Palinurus. In classical legend, the steersman of the ship of Aeneas. The promontory of Palinurus, now Cape Spartivento, on the coast of Lucania, in Italy, is said in the Aeneid to have been named from this hero, who there fell into the sea. The name Palinurus was used as a pseudonym by Cyril Connolly (*q.v.*) in his book *The Unquiet Grave*, 1945.

Palissy, Bernard (c. 1510–89). French potter. Born in S.W. France, he embarked on his



Bernard Palissy.
French potter.

father's trade of glass-painting. At Saintonge he began experiments which, after 16 years of effort, resulted, in 1557, in his perfecting the process of coloured enamel ware which bears his name. He was imprisoned as a Huguenot in 1562, but was released through the influence of the Duc de Montmorency, and in 1564–65 set up his workshop in the Tuileries. Towards the end of his life he was again arrested as a heretic, and imprisoned in the Bastille, where he died. See Pottery. Consult Palissy the Potter, H. Morley, 1852.

Palitana. State of the union of Saurashtra, India; also the chief town of the state. The state lies in the S.E. of the peninsula of Kathiawar, in the Gohilwad division. Grain, sugar-cane, and cotton are grown. The town, 120 miles S.W. of Ahmadabad, is an inland terminus of a branch rly. line, with connexions to Mehsana and Bhavnagar. The holy mountain of Satrunjaya dominates the town. The area of the state is 300 sq. m. Pop., state, 76,432; town, 16,700.

Palk Strait. Shallow channel separating N. Ceylon from the Deccan, India. It lies N. of Adam's Bridge, which separates it from the Gulf of Manaar. It is 45 m. wide at the Bay of Bengal entrance and opens out to the S.W., leading to Palk Bay.

Pall. Heavy cloth, black, purple, or white in colour, used to cover a coffin or hearse. Pall bearers are men who walk by the sides of the coffin, holding the corners of the pall. At the funerals of royal personages and great men, men of eminence usually act as pall bearers. At naval, military, and R.A.F. funerals a Union flag serves as a pall.

Pall. In heraldry, a charge in the form of the capital letter Y. It is supposed to represent the *palium*, and sometimes depicted as such, the lower end terminating in a fringe. More commonly all three ends touch the edge of the shield, unless it is described as couped, with the ends cut off. It should occupy about a third of the field, and is by some authorities classed as a sub-ordinary (*q.v.*). If the ends are cut off to form points the charge is called a shakefork

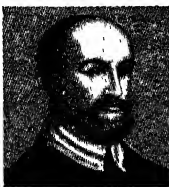


F. T. Palgrave.
British poet
Elliott & Fry

Palladian. A style of classical architecture associated with Andrea Palladio. Simple, correct, and rather cold in form, it was invented to meet the special demands of Venetian patrons, who desired villas and palaces which, while serving all utilitarian purposes, should at the same time present a well-balanced and dignified exterior in the neo-classic manner.

In real Palladian buildings, such as the Palazzo Thiene at Vicenza, a favourite device is the use of two orders of columns or pilasters, the minor order being used to support the arches which occurred between the major. Palladio preferred the Ionic order, and his Corinthian capitals were not well done. He avoided the broken pediment and the pedestal; composed his cornices with an eye to the order employed; and was scrupulously exact in the mathematical arrangement of his doors and windows. *See Architecture*; Jones, Inigo.

Palladio, ANDREA (1518-80). Italian architect. Born at Vicenza, Nov. 30, 1518, he studied at Rome. He is the chief exponent of the new Roman as opposed to the Renaissance architecture. His work was divided mainly between Vicenza and Venice; at the latter city he built the Foscari palace, the Redentore church, and the Carità, and an endless series of villas. His influence on foreign styles was enormous. He died at Vicenza, Aug. 19, 1580.



Andrea Palladio,
Italian architect

Palladium. In Greek legend, a statue of Pallas Athena, which fell from heaven, and was kept in the city of Troy, which could not be taken so long as this statue was there. Shortly before the fall of Troy it was abstracted by Odysseus and Diomedes, who entered the city in disguise. According to another legend, the Palladium was taken to Italy by Aeneas after the fall of Troy, and several cities professed to own it. It was probably a meteoric stone.

Palladium. A metallic element of the platinum family. W. H. Wollaston discovered it in 1804 and named it after the planet Pallas. Its chemical symbol is Pd, and it is one of the transitional elements of the second long period of the periodic table, with ruthenium and rhodium. Its atomic number is 46; atomic weight, 106.70; specific gravity, 12.0;

electrical conductivity, 15; melting point, 1,554 °C; crystal form, face-centred cubic, with lattice constant $a = 3.882$ and an interatomic distance of 2.745 Å.U.

Palladium occurs in nature associated with platinum and the other platinum metals mainly in the metallic form and as arsenide and selenide. The richest source is in the Urals, but deposits have been discovered and often worked to exhaustion elsewhere. In South Africa the metals are found native and in oxide or sulphide ores. Since 1920 the low-grade copper nickel ores at Sudbury, Ontario, have become the chief source of the platinum metals. They are concentrated with the two base metals throughout the smelting operations and then separated electrolytically and by fractional crystallisation of salts. The hot metal readily absorbs gases and precautions have to be taken to reduce this absorption. It will absorb large volumes of hydrogen, one vol. of palladium being capable of absorbing 800 vols. of hydrogen at room temperature.

Palladium is about half as heavy as platinum, but otherwise closely resembles it, though considerably cheaper. It is harder and stronger than platinum, having an ultimate tensile strength of 12 tons per sq. in. in the annealed state, compared with platinum's 10; and a Vickers hardness of 40, increasing to 105, when it is cold worked. It is not corroded by air at ordinary temperatures, but it will oxidise at 400 °C., the oxide dissociating again at about 900 °C. The metal is easily rolled into sheet, drawn into wire, or fabricated in other ways. Palladium leaf, similar to gold leaf, can be made in sheets less than 1/250,000 inch thick and is used for decoration. The chief use of palladium is in the electrical industry, where it is used for contacts, especially for telephone relays and street traffic control. Its use, both alone and as alloys with rhodium and ruthenium, for the manufacture of jewelry has much increased. Palladium salts have been used in photographic toning baths and it is employed as a hydrogenation catalyst in certain chemical processes. *See Platinum.*

Palladium. Place of entertainment, in Argyll Street, London, W.1. It was opened as a music hall, Dec. 26, 1910, and became a favourite centre of variety shows before and during the First Great War. Reopened as a theatre Dec. 26, 1921, it staged revues and

spectacular variety performances, and became the home of the Crazy Gang: Flanagan and Allen, Naughton and Gold, Nervo and Knox. It was the scene of several royal command variety performances attended by George V and George VI. The theatre seats 2,388.

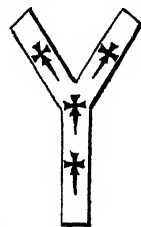
Pallas. One of the minor planets or asteroids. It is remarkable for the great inclination of its orbit to the ecliptic (34°). The second to be discovered, it was found on March 28, 1802, by Olbers (1758-1840). *See Asteroids.*

Pallas. In Greek mythology, epithet of, and later name for, the goddess Athena. It perhaps means virgin. One of the Titans was also called Pallas. *See Athena.*

Pallas. Freedman of the Roman emperor Claudius. Together with another freedman named Narcissus, and Agrippina, wife of Claudius, he administered the empire. On the accession of Nero he was dismissed from office, and, after living some years in retirement, fell a victim to Nero's desire to possess his immense fortune.

Palliser, SIR HUGH (1723-96). British admiral. The son of a soldier, he was born in Yorkshire, Feb. 26, 1723, and entered the navy in 1735. In 1746 he obtained command of a ship, and in 1759 took part in the operations against Quebec. In 1764 he was made governor and commander-in-chief at Newfoundland; in 1770 controller of the navy; and in 1773 a baronet. When serving under Keppel in 1778, he engaged the French fleet but the action was not pressed to a conclusion. Palliser, whose house was burned by a mob, resigned his office and was tried by a court-martial, which gave an ambiguous verdict. However, he was made governor of Greenwich Hospital and an admiral, and he died March 19, 1796.

Pallium or **PALL** (Lat., cloak). Ecclesiastical vestment. Bestowed by the pope upon archbishops and certain bishops of the Latin Church, and equivalent to the *omophorion* of the Greek Church. It is made of white woollen cloth, Y-shaped, worn over the shoulders, falling back and front, and is embroidered with black or purple crosses. It signifies that the wearer possesses fullness of episcopal office, and



Pallium worn by archbishops of the Latin Church
Burns, Oates & Washbourne

is buried with him. Of obscure origin, it is supposed to have affinity with the breastplate of the Jewish high priest. In early times the word was applied by the Romans to the Greek cloak (*himation*), particularly affected by Diogenes and his followers. Later it became, in an enriched form, the robe of the emperor.

Pall Mall. London thoroughfare. It runs W. from the junction of Cockspur Street and Pall Mall East, where is an equestrian statue of George III by Wyatt (1836), to St. James's Palace. Originally formed about 1690, and at first called Catherine Street, it is, like The Mall (*q.v.*) named after the French game of *paille-maille*, or *mail-mall*, played here in the 17th century. On its S. side, going W., are the United Service, Athenaeum, Travellers', Reform, Royal Automobile, Oxford and Cambridge, and Marlborough-Windham clubs; on the N. side the Junior Carlton and Army and Navy clubs. Several of these had their premises damaged by German bombs in the Second Great War. The Carlton Club suffered seriously and had to move.

The R.A.C. is on the site of the old war office, which was formed from part of Schomberg House, 1650, once the residence of Cosway and Gainsborough. At the S.W. extremity of the street is the entrance to Marlborough House. On the site of No. 79 was a house in which Nell Gwynn lived the last 16 years of her life. At No. 51, Dodsley, the publisher, had a shop. At the old Star and Garter inn, Jan. 24, 1765, the 5th Lord Byron fatally wounded Chaworth in a duel. The Royal Society of Painters in Water Colours has its gallery in Pall Mall East, which runs W. from the National Gallery. Pall Mall was the first London street to be lighted with gas, 1807.

Pall Mail. Obsolete game, called *paille-maille* in France, whence it was introduced into England in the reign of Charles I. It was a kind of combination of croquet and golf, boxwood balls being driven by mallets through iron hoops set in an alley about 800 yards in length and floored with powdered cockle-shells. The game, which enjoyed great popularity after the Restoration, is mentioned by Pepys. It was first played in the long alley near St. James's Palace now called Pall Mall, and there was another alley in St. James's Park. A mallet and some balls used in the game

were found in a house in Pall Mall demolished in 1845, and are now in the British Museum.

Pall Mail Gazette. THE. Former London evening newspaper, established by George M. Smith, Feb. 7, 1865. Frederick Greenwood was the first editor. His successors included John (Viscount) Morley, W. T. Stead, who created a sensation by his articles on the white slave traffic, entitled *The Maiden Tribute of Modern Babylon*, which led to his imprisonment in Holloway; and E. T. (afterwards Sir Edward) Cook. After absorbing *The Globe* in 1921 the P.M.G. was itself incorporated in the *Evening Standard*, 1923. The title of the paper was taken from that "written by gentlemen for gentlemen" in Thackeray's *Pendennis*.

Palm. Old, natural measure of length, taken from either the breadth or the length of a man's hand. In Britain a palm was reckoned either as three or four inches, in Roman measure it equalled about 3 ins. The word is used in Holland as the equivalent of one decimetre. *See Hand.*

Palm (Palmae). Family of trees, natives of tropical and sub-tropical

sheath, which remains after the leaf is dead, and gives the characteristic ruggedness to the stem.

The flowers are produced in a great branching cluster, usually from the axils of the leaves. In some species male and female flowers are produced by the same tree, in others the sexes are in separate trees. The fruits are either berries, plum-like (drupes), or, as in the coconut, invested with a hard woody shell covered with a very thick fibrous husk. Coconuts and dates are of great importance as food, and large quantities of sugary fluid or starch are furnished by the stems of some species. The leaves are utilised for thatching, basket-making, mats, and hats, and the fibres of the leaf-sheaths are of economic importance.

A number of species are in cultivation in greenhouses as ornamental foliage plants, mostly in a juvenile condition. *See Assai; Australian Feather-Palm; Bactris; Coconut Palm; Date; Deleb Palm; Doom Palm; Fan-Palm; Oil Palm; Raphia; Rattan; Toddy Palm; Wax Palm, etc.*

Palma DE MALLORCA. Capital of the Balearic Isles, a prov. of Spain. It is a seaport on the S.W.



Palma, Majorca. A general view of the town crowned by its Gothic cathedral

regions. There are about 1,500 known species distributed in 200 genera, many of them familiar from their economic importance—such as coconut (*Cocos nucifera*), oil-palm (*Elaeis guineensis*), date (*Phoenix dactylifera*), betel (*Areca catechu*), wine-palm (*Raphia vinifera*), etc., all of which are described under their names. There is only one European species (*Chamaerops humilis*), which is found in the Mediterranean region. In a few cases, such as nipa and vegetable ivory (*Phytelphas*), the stem is dwarfed and the leaves radical, but as a rule, it is tall (up to 150 ft.), unbranched, and terminates above in a crown of very large fan-shaped or feather-shaped leaves. These are attached to the stem by a firm

coast of Majorca, 135 m. from Barcelona. Built in an amphitheatre overlooking the bay of the same name, with orange groves outside the walls, the houses are in the Moorish style. The Gothic cathedral dates from 1232–1601; the exchange and the governor's palace are interesting buildings. Manufactures include silks, woollens, liqueurs, chocolate. It is the port for the island and trades specially in fruit and vegetables. During the Spanish Civil War, 1936–39, there was a naval base here, used by Gen. Franco. Pop. 131,951.

Palma OR SAN MIGUEL DE PALMA. Most westerly of the Canary Islands. Lying 67 m. W.N.W. from Tenerife, it is 26 m. long by 16 m. wide, and has an

area of 280 sq. m. The mountainous interior culminates in the Pico de la Cruz, 7,730 ft.; severe volcanic eruptions took place here in 1949, several villages being destroyed. Wines, fruits, honey, and silk are produced in the fertile wooded valleys. The capital is Santa Cruz de la Palma, on the E. coast. Pop. est. 53,000.

Palma di Montechiaro. Town of Italy, in Agrigento prov., Sicily. It is a small modern town noted for the quality of its almonds, and is reached by steamboat from Licata or Porto Empedocle.

Palma Vecchio (c. 1480–1528). Name by which Giacomo Negretti or Palma, Italian painter, is generally known.



Palma Vecchio,
Italian painter
Self-portrait in Pinakothek, Munich

Born near Bergamo, he probably studied under Cima da Venice, where he continued to work, and where he died, July 28, 1528. Strongly influenced by Titian and Giorgione, his classic composition and characteristic colouring make his work easily recognizable, especially his Holy Conversation pictures. Examples of his work are on view in many continental galleries. He is called Vecchio (old) to distinguish him from his grand-nephew Jacopo Palma (1544–1628). See Barbara, S.

Palm Beach. Winter resort of Florida, U.S.A., in Palm Beach co. It stands on a narrow island, 30 m. long, separating Lake Worth from the Atlantic, 300 m. by rly. S.S.E. of Jacksonville, and 65 m. N. of Miami. With West Palm Beach, the co. seat, which extends 12 m. along the opposite shore of the lake, it is one of the world's most luxurious winter resorts; some 200,000 visitors come every season. The two towns on the easternmost portion of the coast are served by Seaboard air line and Florida East Coast rly. The Gulf Stream contributes to the equable climate. Development began in 1892. Both towns were damaged in the hurricane of 1928. Pop. 3,747.

Palmer. Name given to any Christian who had made a pilgrimage to the Holy Land. He brought back a consecrated palm staff or branch as evidence of his journey. The surname Palmer is probably a survival. See Pilgrim.

Palmer, Sir Charles Mark (1822–1907). British shipbuilder. Born at South Shields, Nov. 3,

1822, he joined a shipping firm in Newcastle. Later, in 1850, he built the first iron screw collier to develop the coal trade with London, and then added others. In the meantime he had become interested in coal and iron, and erected huge works at Jarrow. He was M.P. for North Durham, 1874–85, and for Durham (Jarrow) until his death, June 3, 1907. He was created a baronet in 1886.

Palmer, Samuel (1805–81). British painter. Son of a bookseller, he was born in London, Jan. 27, 1805, and studied under John Linnell whose son-in-law he afterwards became. Influenced by Blake's visionary world, he painted many water-colour landscapes with a strange mystical beauty. These belonged to the most vital and important period of his youth; his work became heavier and more stilted after his 30th year. Palmer remained unappreciated during his lifetime. He translated Virgil's Eclogues, illustrated by his own etchings, and made drawings for the works of Milton. He died at Reigate, May 24, 1881. He is represented at the Tate Gallery. Consult *The Visionary Years*, G. Grigson, 1947.



Samuel Palmer,
British painter
After J. Linnell

Palmer, William (1825–56). British poisoner. He was hanged at Stafford gaol, June 14, 1856, for poisoning a racing associate, John Parsons Cook, with antimony and strychnine. Palmer was a country surgeon at Rugeley, when he became involved with money-lenders as a result of betting. By 1855 he was driven to raise money by forged acceptances, and it was the fear of disclosure and prosecution which drove him to his final crime. His victim Cook won the Shrewsbury Handicap with his horse Polestar, and a large sum of money in bets, which Palmer determined to obtain. Cook put up at the Talbot Arms, opposite Palmer's house at Rugeley. Cook was taken ill, and from the morning of Nov. 17, 1855, to the evening of the victim's death on the 20th, Palmer literally administered everything that passed the sick man's lips. Palmer is supposed to have poisoned at least six other persons, including his brother and mother-in-law, whose lives he had insured. A novel, *Slow Poison*, J. Rowland, 1939, was based on

Palmer's trial. Consult *Trial of W. Palmer*, ed. G. Knott, 1912.

Palmerston. Former name of the port of Australia, in Northern Territory, now called Darwin (*q.v.*).

Palmerston, Henry John Temple, 3rd Viscount (1784–1865). British statesman. Born Oct. 20, 1784, at his father's seat, Broadlands, Hants, he belonged to an Irish branch of the family of Temple. Sir John Temple, speaker of the Irish house of commons, had



Lord Palmerston,
British statesman

a son Henry, who, in 1723, was made an Irish viscount. His grandson was the statesman's father. Educated at Harrow, Henry succeeded in 1802 to the title, went to St. John's College, Cambridge, and in 1807 entered the house of commons as M.P. for Newtown, Isle of Wight. At once he was appointed a lord of the admiralty, and in 1809 he became secretary at war, an office he retained until 1828, being in the cabinet from 1822.

A Tory, he served under Perceval, Liverpool, and their successors, but after Canning's death, like other of that statesman's followers, he gravitated towards the Whigs and made a study of foreign affairs. In 1830 he was made foreign secretary under Grey, and he was at the foreign office with the Whigs until 1841, except for a period in 1834–35. He came back to the same office under Russell in 1846, but in 1851, having offended the queen and his colleagues by approving of Louis Napoleon's *coup d'état* without consulting them, he was dismissed. He was home secretary 1853–55, and then disgust at the management of the Crimean War brought him the post of prime minister. He left office in 1858, but from 1859 was prime minister until his death, Oct. 18, 1865. During 1811–31 he had represented the university of Cambridge, and during 1831–65 the borough of Tiverton. Except for a few months he had sat in parliament for 58 years.

Palmerston was notable for his vigorous and even aggressive assertion of Britain's rights. For thirty years the spokesman of his country to foreign powers, he was largely responsible for the separation of Holland and Belgium in 1830; was active in checking the influence of Russia at Constantinople; sympathised with the

movement for Italian unity; and was continually suspicious of France. Never afraid of responsibility, he often ignored his colleagues and as often offended foreign statesmen. His attitude was a blend of bluff and belligerency, but his obvious devotion to British interests and his plainness of speech made "Pam" popular with the people.

Very autocratic, especially in later years, his conservative attitude of mind was responsible for the postponement by the Liberal party of democratic measures which were put forward after his death. He left no children, and his estates, including Broadlands, his seat at Romsey, passed to Lord Mount Temple, and then to the Hon. E. Ashley, both being related to Lady Palmerston, who was the widow of the 5th Earl Cowper. Palmerston was a nobleman of the old school, a sportsman, fond of society, the card table, and the racecourse, but possessing also the graces that marked the last of his kind. A statue of Palmerston stands in Palmerston Park, Southampton.

Bibliography. The standard Life is by Lord Dalling and E. Ashley, 1879. Others are by L. Sanders, 1888; B. K. Martin, 1924; P. Guedalla, 1926; E. F. M. Smith, 1935; H. C. F. Bell, 1936. *Consult also* P.'s Correspondence with Gladstone, ed. P. Guedalla, 1928.

Palmerston North. City of North Island, New Zealand, 88 m. N.N.E. of Wellington. It is a rly. junction; the industries of the neighbourhood are chiefly saw-milling and dairy farming, and it has a government experimental farm. Pop. 29,200.

Palmetto (*Sabal palmetto*). Tree of the family Palmae. It is a native of southern N. America, and has a stem from 20 to 40 ft. in height, with a spreading crown of long-stalked, heart-shaped leaves, 6 to 8 ft. long, with numerous divisions from the margins. The leaves are split up and plaited into "chp" hats.

Palmgren, SELM (b. 1878). Finnish composer. Born at Björneborg (Pori), Feb. 16, 1878, he studied at Helsingfors (Helsinki) conservatoire, and with Busoni in Italy. A brilliant pianist, he produced many short lyrical pieces for the piano. He also wrote piano concertos — Metamorphoses and

The River—and infused into his compositions a national flavour reminiscent of Grieg. Other works included two operas and incidental music for the theatre. He married the singer Maikki Järnefelt, with whom he toured extensively, and in 1923 settled at Rochester, N.Y., becoming teacher of composition at the Eastman school of music.

Palmi. Town of Italy, in Reggio di Calabria province. It is situated on the slope of Monte Elia amid orange groves and olive plantations, has a port on the Gulf of Gioia, and is 26 m. by rly. N.N.E. of Reggio. It is in the earthquake zone and suffered severely in 1783 and in 1908. Pop. 13,346.

Palmiet Rush (*Prionium palm-ita*). Perennial plant of the family Juncaceae. It is a native of S.

Africa, growing in swamps and rivers, frequently choking the latter. Unlike other rushes, it forms a trunk-like stem 5–10 ft. long, which is partly submerged. From the top of this springs a cluster of sword-shaped leaves, which are an inch broad at the base. The greenish-yellow, rush-like flowers rise from the centre of the leaf-tuft in a cluster several feet long. The leaves

are used for thatching, and contain strong fibres, those from the lower part being used for making brushes, and as a substitute for horsehair stuffing.

Palmira. Town of Colombia. It is in the Central Valley W. of the Central Cordillera, on the main road through Valle del Cauca dept. About 160 m. S.W. of Bogotá and 10 m. from the rly. terminus of Cali, it is the centre of a fertile dist. notable for tobacco. Pop. 45,055.

Palmistry. Art or practice of hand reading, also called cheiromancy. This is of great antiquity and in the Middle Ages was considered one of the black arts. Palmistry is divided into two heads: cheirognomy, which deals with character reading from shape and texture of hand, fingers, and nails; and cheirogony, which deals with marks and lines on the palm, by which are read past, present, and future events. The fingers are named Jupiter, Saturn, Apollo, and Mercury, and the fleshy pads at the base of the fingers are called mounts.

The principal lines on the palm are named life line, head line,



Diagram of left hand, illustrating principal lines and significant parts. Fingers—A, Jupiter; B, Saturn; C, Apollo; and D, Mercury—have each 3 phalanges, numbered 1, 2, and 3. On the hand: 1, 2, 3, and 4 are mounts of Jupiter, Saturn, Apollo, and Mercury respectively; 5, mount of Luna; 6, mount of Venus; 7, mount of Mars. Principal lines are: E E, Life; F F, Head; G G, Heart; H H, Fate; X X, Apollo.

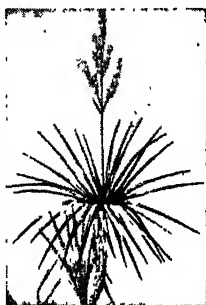
heart line, fate line, and line of Apollo. From the life line is judged length of life, etc. From the head line are judged intellectual qualities and characteristics concerning business or profession. The heart line deals with the affections, the fate line with events of the future. By the line of Apollo is traced the gain or loss of riches, etc.

Mounts interpret character and denote courage, imagination, pride, benevolence, love of art, etc. A hand with few lines clearly marked and of good colour is considered a fortunate hand; a hand with numerous lines and marks is considered unfortunate.

A person who professes to tell fortunes or uses any subtle craft, means, or device by palmistry to deceive anybody may be convicted of being a rogue and vagabond.

Palmitic Acid. One of the fatty acids, to which the chemical formula $C_{15}H_{31}CO_2H$ is assigned. It was called palmitic acid by its discoverer Heintz in 1852, because it is obtained in large quantities from palm oil, in which it occurs as palmitin. Palmitic acid occurs in other vegetable and animal fats, but palm oil is the best source. It is prepared by boiling palm oil with caustic potash, decomposing the soap thus formed by sulphuric acid, and purifying the palmitic acid by recrystallisation from alcohol.

Palm-nut Cake. Artificial feeding stuff. A product of tropical W. Africa, it is made from the kernels of the palm nut (*Elaeis guineensis*) after the oil has been



Palmiet Rush. Leaf cluster and flower

extracted. It is also on sale in the form of meal.

Palm Oil OR **PALM BUTTER**. Oil extracted from the fleshy part of the fruit of several species of palm. The fruits are allowed to ferment and then pressed, a lower quality being obtained by boiling the residue with water and skimming off the oil. When fresh palm oil has a pleasant violet-like odour. It is composed of tripalmitin and olein and melts at 27° C., is soluble in ether and turpentine, and is used to make candles and soap.

Palm Sunday. Sixth Sunday in Lent, a week before Easter. On this day the Christian churches celebrate Christ's entry into Jerusalem, when the multitude strewed palm leaves and branches, emblems of victory and rejoicing, on the way (John 12). Also known as Flower Sunday (Lat. *Pascha Floridum*), the day is mentioned as early as the 4th century. In the R.C. Church it is celebrated by the blessing and distribution of palm or olive branches, and a procession. There is a procession in the Greek Church on this day. The Church of England abandoned the ceremony in 1549, but the custom of decking churches with willow sprigs is still carried out.

Palmyra. Ancient city of Syria. It stood about 150 m. N.E. of Damascus. According to 2 Chron. 8, v. 4, Tadmor, as it was at first called, was founded by Solomon. Under the Roman empire it became a great commercial centre by its position on the trade routes between E. and W. Its ruler Odenathus, c. A.D. 260, made it virtually independent of Rome. His widow Zenobia had more ambitious designs and sought to create an independent empire embracing all Syria, Asia, and Egypt. She was defeated by the emperor Aurelian, and Palmyra subsequently fell into decay. It is now deserted, but some splendid ruins, of the late Roman period, still testify to its former greatness. The city, surrounded by walls of the age of Justinian, is intersected by a street with a quadruple colonnade and an imposing triumphal arch. There are sepulchral towers, and among the temples the greatest is that of the sun, in a vast pillared enclosure

Palmyra Palm (*Borassus flabellifer*). Tree of the family Palmae, native of India. It has large fan-shaped, plaited leaves split at the edges. With the spiny leaf-stalk included, each leaf is 8-10 ft. long. Each tree bears flowers of one sex only—the males in branching catkins, the females in unbranched spikes. The three-seeded brown fruits are each as large as a child's head, produced in clusters of 15 or 20. From the unexpanded flower-spikes palm wine is obtained in quantity, which is evaporated into jaggery, or palm sugar, fermented into toddy and vinegar, and distilled to produce arrack. The trunks of old trees yield hard and durable timber; and the leaves serve a variety of useful purposes, including matting, basket making, hats, umbrellas, fans, and thatch. Seedling plants are used as food, and the pulp of the fruit furnishes a kind of jelly.



Palmyra Palm, leaves and fruit

Palni. Range of hills in Madras state, India. It lies mainly in Madura dist., N.E. of the N. end of the Cardamom Mts. and culminates in Vembadi Shola, 8,218 ft. high.

Palo Alto. City of California, U.S.A., in Santa Clara co. It is on the San Francisco peninsula, and 29 m. by rly. S.S.E. of that city. Laid out in 1891 primarily as the seat of Leland Stanford Junior university (*q.v.*), it is also the seat of a military academy, and a veterans' hospital. Agriculture and fruit-farming are local industries. It was incorporated 1894 and chartered as a city 1909. Pop. 16,774.

Palomar. Mountain in California, U.S.A. Lying 66 m. N. of San Diego, it is a peak of the Santa Anna mountains in the San Bernardino district, and has an alt. of 5,565 ft. Because of its rarefied atmosphere, it was selected as site of an observatory. See Mount Palomar Observatory.

Palos de la Frontera. Town of Spain. It is in Huelva prov., near the S.W. frontier, close to the

estuary of the Rio Tinto, 5 m. from the Atlantic Ocean. From here Columbus sailed, Aug. 3, 1492, on his historic voyage, and here Cortés landed in 1528, after his conquest of Mexico. Pop. 1,900.

Palpitation. Violent throbbing of the heart. It may be due to disorder of the heart, indigestion, excessive smoking, violent exercise, alcoholism, taking too much tea or coffee, or strong emotion. Treatment depends upon the underlying cause. See Heart.

Palstave (Icel. *palstafr*, spud-staff). Winged celt, with the haft-end thinned for fitting into a split wood or horn handle. It originated in the Bronze Age, preceding the socketed celt (*q.v.*).

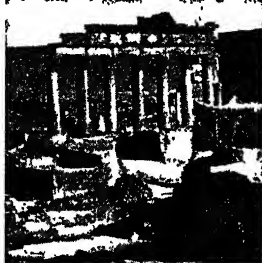
Paludrine. Synthetic drug used in the prevention and treatment of malaria (1-*p*-chlorophenyl-5-isopropylbiguanide). First synthesised, 1943, in the I.C.I. laboratories, Manchester, as a substitute for quinine, it was announced 1946, and the formula made public.

Palwal. Town of Punjab state, India. It is 30 m. S.E. of Gurgaon, and is reputed to have been restored by Vikramaditya in 57 B.C. It contains an early Mahomedan mosque, is a grain market, and has a station on the rly. from Delhi to Agra. Pop. 13,606.

Pamaquin. Synthetic antimalarial substance used alone or with quinine or mepacrine.

Pamela. Novel by Samuel Richardson, first published, 1741-42, with the title of Pamela, or Virtue Rewarded. The author ascribed the genesis of the book to fellow booksellers having asked him to write a little volume of a common style that should give to country readers useful models of familiar letters. The two or three letters, which were to be devoted to instructing handsome girls, going out to service, how to avoid the snares that might be laid against their virtue, grew into a lengthy epistolary story, which not only had extraordinary popularity, but set the fashion of the sentimental novel. See Novel.

Pamiers. City of France. It stands on the Ariège, in the department of that name, 40 m. S. of Toulouse. The chief buildings are the cathedral, which has been modernised, and the Romanesque church of Notre Dame. The site of the castle is occupied by a public promenade. Industries include ironworking, tanning, brick making, and sawing. The city is an agricultural centre, and around are vineyards and nursery gardens. Pamiers grew up around a castle



Palmyra. Ruins of the ancient Temple of the Sun

built in the 12th century by a count of Foix. There was an abbey here, and much friction was caused by the conflicting authorities of the count of Foix, the bishop, and the abbot. Fauré and Delcassé were natives. Pop. 12,026.

Pamir OR ROOF OF THE WORLD. Greatest mountain knot in the world. It occurs where the plains of N. India (Kashmir) approach most closely those of Asiatic Russia (Tadzhik S.S.R.), and Afghanistan touches China (Sinkiang prov.). From it radiate the Kwenlun, Karakoram, Himalaya, Suleiman, Hindu Kush, Paropamisus and Tien Shan ranges. Comprising a series of ridges of elevation varying from 16,000 ft. to 18,000 ft., with elevated valleys or pamirs between them, this great highland is almost without vegetation. Politically the greater part belongs to Tadzhik S.S.R. The sparse pop. consists of Kirghiz.

Pamlico Sound. Body of water on the coast of N. Carolina, U.S.A. The largest of many lagoons on the E. coast of the U.S.A., it is separated from the Atlantic by a long, narrow strip of land, with three navigable inlets, and measures about 60 m. by 25 m. Oyster fishing is extensively carried on.

Pampa Central OR LA PAMPA. Territory of Argentina. Entirely inland, W. of the prov. of Buenos Aires, N. of the territory of Rio Negro, it is true pampa country crossed by the Colorado and Salado rivers. Rlys. from Bahia Blanca cross the S. and N.E. of the state. Agriculture occupies most of the people, wheat, alfalfa, maize, and linseed being exported in large quantities; while there are large numbers of cattle and sheep. Santa Rosa is the centre of administration. Area 55,669 sq. m. Pop. 166,900.

Pampas. Temperate grasslands of S. America, situated W. of the Paraná river and E. of the Andes. They support vast numbers of cattle and sheep, and produce enormous quantities of wheat for export. See Argentina; Steppe.

Pampas Grass (*Gynerium argenteum*). Noble grass of the family Gramineae. It is a native of S. America, where it grows on the pampas. It forms a tuft 5-6 ft. in diameter, its long, slender, arching leaves being about 6 ft. long.



Pampas Grass. Tuft of the South American grass

The flowers form large, dense, silky, and silvery-white plumes rising to a height of 10 or 12 ft., bearing 40 or 50 plumes.

Pampas Indians. Collective term for the S. American Indians upon the Argentine plains. In the N. they were largely of Guaycuru and Guarani stocks. On the true pampas they mingled with the Araucanian Puelche. Usually unclad, they were predatory and warlike, becoming eventually better riders than the Gauchos. They migrated beyond the Rio Negro in 1881. See American Indians.

Pampero. Severe line squall, usually accompanied by rain, thunder, and lightning, experienced in Argentina and Uruguay in the neighbourhood of the Plate estuary. It is associated with depressions moving W. to E.; as the depression passes the wind suddenly shifts to S. or S.W. with a great drop in temperature.

Pamphlet. Treatise of short or moderate length, usually unbound and of small format, and generally dealing with matters of current public interest. In a technical sense, a pamphlet is a printed work with eight or more pages of matter, the whole not exceeding five sheets.

The derivation of the word is obscure, some authorities claiming that it comes from Pamphilus or Pamphila, a Latin poem which circulated widely in mediæval times. From the time of the Reformation the pamphlet has been of considerable historic importance and often exercised much political, ecclesiastical, and social influence. Wycliffe, Erasmus, Luther, and Calvin used it, and the Civil War in England produced an astonishing crop of controversial works in pamphlet form, many, such as

those of John Milton, of great interest. One of the most celebrated collections is that of Civil War pamphlets in the British Museum, numbering over 22,000.

Defoe, Swift, William Law, "Junius," and Newman represent various aspects of pamphlet-writing. Periods of war and revolution bring the pamphlet into active life, e.g. 1789-1815, 1848, 1914-18, 1939-45. During the last period the pamphlet form was particularly useful because of the great scarcity of

paper, and govt. departments played a leading part in repopularising it. See Tract.

Pamphylia (Gr., land of all tribes). Ancient region on the S. coast of Asia Minor, between Lycia on the W. and Cilicia on the E. Its inhabitants were of mixed race, partly Semitic and Greek. Pamphylia belonged successively to the Persian and Macedonian empires and to the kingdom of Syria and of Pergamum, from which, in 133 B.C., it passed to Rome.

Pamplona. City of Spain, capital of the prov. of Navarre. It is 16 m. from the French frontier, among the foothills of the W. Pyrenees, on the Arga, a tributary of the Aragon, 195 m. N.E. of Madrid. It is a rly. centre for the prov. The Gothic cathedral was built in 1397 over the ruins of the earlier edifice of 1100. The Cortes of Navarre met in the Sala Preciosa in the cathedral. The bull-ring seats 13,600. Pamplona was the capital of the ancient kingdom of Navarre. It was rebuilt by Pompey in 68 B.C., taken from the Romans by the Visigoths in 476, sacked by Charlemagne, unsuccessfully attacked by Moors and Castilians, blockaded by Wellington, and besieged by Carlists. Pop. 75,002.

Pamplona. City of Colombia, in the dept. of Santander. It is 40 m. S. of Cucuta near the Venezuelan frontier. Founded by the Spaniards in 1549, it was for a time a valuable source of gold. Now it exports coal, dyewoods, coffee, cacao, gum, resin, and wheat, besides some gold. There are breweries, distilleries, and textile mills. Pamplona is the see of a bishop. Pop. 21,381.

Pan. In Greek mythology, the god of shepherds. Generally regarded as the son of Hermes, and especially associated with Arcadia, his worship afterwards spread throughout all parts of Greece. He was of monstrous appearance, with the horns and legs of a goat. He was the inventor of the flute, or shepherd's pipe, which he made from reeds, after the nymph Syrinx, whom he had pursued, had at her own request been turned into a reed by the gods. The sudden apparition of Pan to travellers caused terror, whence the word panic. The legendary representation of the devil is a memory of Pan and similar beings.

Panaetius. Stoic philosopher of the 2nd century B.C. A native of Rhodes, educated at Pergamum and Athens, he came to Rome, and was there admitted to the friendship of Laelius and Scipio the

Younger, later becoming the foremost teacher of Greek philosophy in Rome and in Athens.

Panama. Republic of Central America, formerly a dept. of the republic of Colombia, with which



Panama Republic
arms

it was united for 82 years. In 1903 discussions were opened by the U.S.A. with a view to taking over the existing canal works of Ferdinand de Lesseps and constructing a canal across the isthmus. A treaty, giving Colombia \$10,000,000 (then £2,000,000) and \$250,000 (£50,000) a year in exchange for a six-m. wide strip of land was approved by the U.S. senate but rejected by Colombia. The people of Panama, afraid that the U.S.A. might choose the alternative canal route through Nicaragua, rebelled Nov. 3, 1903. The U.S. navy deterred Colombian troops from landing, and ten days later the U.S.A. recognized the independence of the new republic of Panama. By a treaty with the U.S.A., entered into in 1914 and ratified in 1921, Colombia recognized the independence of Panama, receiving from the U.S.A. \$25,000,000 (£5,000,000) in compensation for loss of territory.

The republic occupies the isthmus connecting N. and S. America and lies between the Caribbean sea to the N. and the Pacific ocean to the S. It covers an area of 28,576 sq. m.; It is divided into seven provs., Bocas del Toro, Chiriqui, Coclé, Colon, Los Santos, Panama, and Veraguas. The chief town, after Panama city (*v.i.*), is Colon (pop. 44,393) on the Atlantic.

The first American trans-continental rly. was built across the fifty-mile narrows of Panama. A concrete highway now also traverses the isthmus, which can be crossed in 1½ hrs. by car. Panama also has important airfields.

Two mt. ranges enclose valleys and tablelands with excellent pasturage. On the mt. slopes there are extensive forests. In the lowlands the climate is tropical and the Panamanian jungle is one of the extraordinary sights of America with its giant humming birds,

multi-coloured parakeets, snow-white egrets, alligators, green lizards, snakes, scorpions, tapirs, pumas, and hosts of monkeys.

The chief exports are bananas, cocoa, coconuts, and pearls.

The pop. of 622,576 is highly diverse in origin and drawn from all parts of the world. Indians of full blood comprise about 10 p.c., Negroes about 13 p.c. Spanish is the official language, though English is much spoken.

A new constitution, promulgated March 1, 1946, extended the term of the president from four to six years and made him ineligible to succeed himself. The national assembly, which meets biennially on Jan. 2, has 32 members elected for six years. Women have equal political rights with men.

The R.C. religion prevails, but there is religious freedom. Primary education is free and compulsory from seven to 15. The national university, opened Oct. 7, 1935, is at Panama city. There is no army or navy.

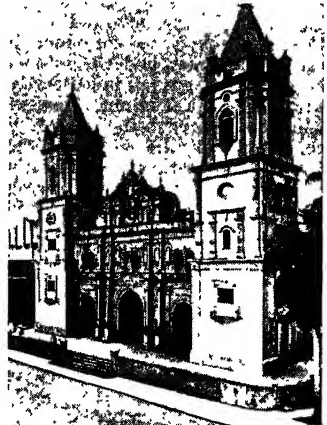
Panama declared war on Japan Dec. 8, 1941, on Germany and Italy Dec. 12. She took no active part in the war, but in 1942 leased to the U.S.A. 134 bases for the protection of the Panama canal (*q.v.*); 120 were returned at the end of the Second Great War. Negotiations for the retention of the other 14, including a bomber base at Rio Hato, for a further period of 5-10 years, broke down Dec., 1947, with the unanimous refusal of the assembly to ratify an agreement to that effect.



Panama, Central America. Ruins of the old cathedral, looted and burned by Morgan, the pirate; top, right, facade of the present cathedral

Panama. Capital of the republic of Panama. It lies close to the Pacific entrance to the Panama canal and is 47 m. from Colon on the other side of the isthmus, with which it is connected by rly. and a concrete motor road. Settled in the 17th century, Panama city

was sacked and destroyed by Morgan, the buccaneer. The present city blends the charm of old Spain with American progressiveness. The bazaar, with its curio sellers from India, China, and other countries, has an Asiatic atmosphere. The twin-towered cathedral, finished in 1776, has its domes sheathed in mother-o'-pearl. Other buildings of note are the national university, the national theatre (one of the finest of its kind), the city hall, the government palace, the post office, and many fine churches, of which that of S. Jose is celebrated for its golden altar, said to have been preserved from the buccaneers by being painted over to represent grained wood. The climate is good from Jan. to April; during the rest of the year the rainfall is heavy. The mean temp. is 80° F.



There are breweries, shoe and furniture factories, and native potteries. There is a ferry across the Pacific entrance connecting La Boca, Balboa, and Panama city on the E. bank of the canal with Thatcher highway on the W. Panama has an active night life. Pop. 111,893.

Panama, GULF OF. Large inlet of the Pacific ocean in Panama. It lies between the peninsula of Azuero and the S.E. littoral of the republic, and is 140 m. wide at its mouth. At its head, some 120 m. N. of the mouth, is the entrance to the Panama canal.

Panama, Isthmus of. Narrow neck of land connecting N. and S. America. It lies E. and W., with the gulf of Panama on the Pacific side and the gulf of Darien on the Atlantic side. Columbus landed on the isthmus in 1502, and here Balboa was the first European to see the Pacific ocean. It averages 70 m. across, but is 32 m. at its narrowest. See Darien.

Panama Canal. An artificial waterway for navigation through the isthmus of Panama and connecting the Caribbean sea with the Pacific ocean. In 1523 Charles V of Spain, convinced that nature had provided no waterway through the isthmian narrow lands, directed Hernando de la Soma to explore the isthmus. Plans were drawn in 1529, and from that time projects were made for the construction of an artificial channel across the isthmus. The opening of the Suez Canal, 1869, was followed by a French attempt to construct a canal at Panama under the direction of de Lesseps; it failed partly through financial mismanagement and partly through the unhealthy conditions at the isthmus—the cause and treatment of malaria were not then understood; work on a sea-level canal, started in 1888, stopped the next year.

The war with Spain, 1898, impressed the U.S.A. with the desirability of quicker water-communication between the U.S. Atlantic and Pacific coasts; and by a treaty ratified Feb. 26, 1904, it acquired from the new republic of Panama (*q.v.*) a 10-m. strip of territory, five m. on each side of the route of the proposed canal, and the right to construct and main-

tain in perpetuity an inter-oceanic canal, for a payment of \$10,000,000 (then £2,000,000) and \$250,000 (£50,000) a year from 1912. The area of the ceded territory, called the Canal Zone, is 552.8 sq. m., of which 191 sq. m. is water. Pop. 48,352 (19,620 Americans).

In 1904 the U.S.A. also took over the rights and property of the New Panama company, which had been "care-taking" at the isthmus since the bankruptcy of the Lesseps company.

The two most important features of the narrowlands of Panama are the Chagres river and the Culebra mts. The river, often swelling to a torrent, crossed the route of the proposed canal; the mts. run down the isthmus near the Pacific coast, interposing a barrier which would have to be cut. The French had chosen to build at tide-level; the Americans decided to build a high-level waterway.

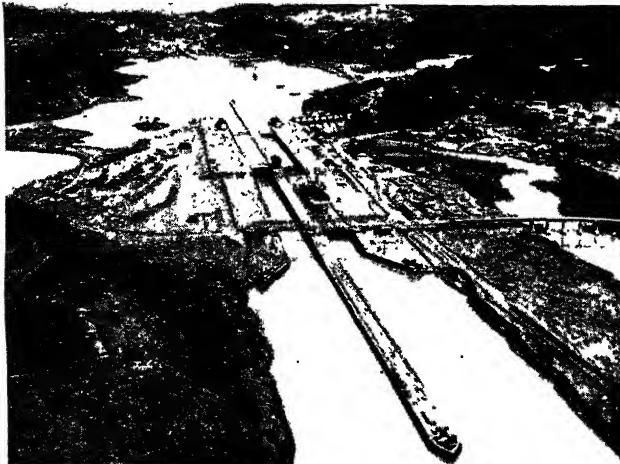
Near the outlet of the Chagres into the Caribbean the Gatun dam, 8,400 ft. long, was built across the channel of the river, and the waters accumulated behind it to form Gatun lake, 164 sq. m. in extent, at



Panama Canal. Map of the great waterway, constructed 1904-13, through which ocean-going vessels can move between the Caribbean and the Pacific

an alt. of 85 ft. The channel of the canal runs for about 30 m. through the lake, to the level of which ships are lifted by locks at either end. The channel of the canal begins about 4½ m. out to sea in Limón bay in the Caribbean at a depth of 41 ft. Through the sea and the shore it runs for 8 m. until it reaches the first locks, the gigantic three-stepped, two-flighted stairways at Gatun. Beyond Gatun lake the channel is compressed into the 8 m. Gaillard cutting through the Culebra mts. as far as the Pedro Miguel lock at the S. end of the 85-ft. above-sea-level section; this lock drops the vessel 30 ft. to the little Miraflores lake, from which the Miraflores locks drop it to the sea-level salt-water stretch of 8 m. to the Pacific. Minimum width of the canal is 300 ft. at the bottom, minimum depth is 41 ft.

Construction was completed in 1913 at a cost of \$366,850,000 (£73,330,000), and the canal was informally opened Aug. 15, 1914, by the passage of the 9,000-ton Ancon. It was formally opened July 12, 1920, by proclamation of the president of the U.S.A. A dam completed near Alhajuela in 1935 created Madden lake, 22 sq. m. in extent, and 260 ft. above sea-level, to maintain the level of Gatun lake in dry seasons. Construction of a new set of locks approx. parallel to the existing locks began in 1940. Passage through the canal normally takes 7-8 hrs.; it has, however, been completed in 4 hrs.



Panama Canal. Air view of the two-stepped Miraflores lock by which vessels are lowered from the Miraflores lake to Pacific level

10 mins. It has been estimated that 10,000 vessels could pass through it in a year. In 1946 the number which went through was 3,747, carrying a total cargo of 15 million tons; they paid nearly \$15 million in tolls. *Consult Panama: the Canal, the Country and the People*, A. Edwards, 1914; *The Panama Canal in Peace and War*, N. J. Padelford, 1942.

Panama Hat. Light hat which can be folded without injury. It is made from the young leaf of a palm, the *Carludovica palmata*, which grows in Central America, also in Ecuador and Columbia, where the hat was for long exclusively manufactured.

Pan-American Airways. Air transport company of the U.S.A. Formed in Oct., 1927, to maintain a service between the U.S.A. and Bermuda, it soon inaugurated routes throughout Latin America. In Nov., 1935, it started a trans-Pacific service to China; in 1938 regular flights to New Zealand; in June, 1939, a mail and passenger service across the Atlantic. The co. was the first to instal high speed land aircraft on the Atlantic route. In 1947, when Pan-American Airways covered 53,000 route miles serving 47 countries, a round the world service was begun. Annual distance flown was some 1,100 million miles.

*** Pan-American Conference.** Properly, the international conference of American states called periodically by the Pan-American Union; the term is loosely used for any conference of representatives of the American republics.

Simon Bolivar (*q.v.*) called a Pan-American conference in Panama in 1826, but only Great Colombia, Guatemala, Mexico, and Peru attended, although the U.S.A. had named a delegate. A treaty of union, league, and confederation was signed but never ratified. The conference officially recognized as the first Pan-American conference was held at the instance of the U.S.A. in Washington in 1890, Santo Domingo being the only absentee. The second Pan-American conference in Mexico City, Oct., 1901, was attended by all the republics. Subsequent conferences took place at Rio de Janeiro, Brazil, 1906; Buenos Aires, Argentina, 1910; Santiago, Chile, 1923; Havana, Cuba, 1928; Montevideo, Uruguay, 1933; Lima, Peru, 1938; Bogota, Colombia, 1948. The work of all these conventions was directed towards increased economic cooperation between the American republics and

solidarity in the event of aggression against an individual state. Machinery was set up for resolving disputes between American republics, and the 1933 meeting played an important part in ending the war between Paraguay and Bolivia.

Other meetings loosely called Pan-American conferences were *e.g.* the Pan-American federation of labour conference at Laredo, Texas, 1919; the Washington conference on arbitration, 1928; and the conference at Buenos Aires in 1936, at which President Roosevelt put forward his plea for a "good neighbour" policy.

During the Second Great War several conferences were held. That held at Rio de Janeiro in 1942 led to the setting up of the Inter-American Defence Board to recommend measures for the defence of the continent. At the Mexico City conference of 1945 it was decided that an international conference of American states should be held at intervals of four years. *See Chapultepec; Havana, Act of.*

Pan-American Highway, or INTER-AMERICAN HIGHWAY. Motor road under construction in the American continent, to run eventually from Alaska to Chile. The Alcan Highway (*q.v.*) links Alaska with the U.S. road system; and from Nuevo Laredo, Texas, the highway leads by way of Mexico City, Guatemala, Tegucigalpa (Honduras), and Costa Rica to Panama city; thence it follows the W. coast of S. America as far as Valparaiso, Chile, where it turns E., crossing the Andes to terminate at Buenos Aires, Argentina. An alternative inland route branches off at Vitor, near Arequipa, Peru, and runs E. to La Paz, Bolivia, and then S.E. to Buenos Aires.

From the Texas border to Panama city the road measures 3,300 m., of which 2,487 m. were in 1946 suitable for motor-traffic in all weathers; impassable gaps in Mexico, Honduras, Costa Rica, and Panama totalled 567 m. The route from Panama to Buenos Aires via Valparaiso measures 5,757 m., of which over 4,000 m. were suitable for all weathers in 1946; via La Paz, the distance is 5,433 m., of which some 3,800 m. are all-weather road. About one-third of the sections described as all-weather road is paved.

Pan-American Union. Organization for the promotion of friendly relations and cooperation between the countries of the Americas S. of the Canadian border. Bolivar first made an attempt in

1826 to form such a union. J. G. Blaine when secretary of state of the U.S.A. made a second attempt, cut short by the death of President Garfield in 1881. He was successful in 1890 under President Harrison after the first conference of the American states. Originally called the international bureau of American republics, its name was changed in 1910 to the Pan-American Union. Its h.q., a magnificent white marble palace in Washington, was the gift of Andrew Carnegie. Its governing board consists of the diplomatic representatives at Washington of all the Latin-American republics, with the U.S. secretary of state. The union is financed by contributions from the member nations in proportion to their pop. One of its normal functions is to draw up the programme for the Pan-American conferences. The adhesion of Canada to the union has been mooted, but without result. *See Pan-American Conference.*

Pan-Arabia. Term for the Arab world. The Pan-Arabia envisaged by, *e.g.*, T. E. Lawrence, included Syria and the Lebanon, Iraq, Palestine and Transjordan, and the whole of Arabia including the Yemen, Hadhramaut, Oman, etc., under the rule of the Hashimite kings of the Hejaz. Developments after the First Great War put an end to such a concept; but at a Pan-Arab conference held at Alexandria, Sept.-Oct., 1944, the Arab League was set up with the support of Iraq, Saudi Arabia, Syria, the Lebanon, Transjordan, and Egypt. *See Arabia; Arab League; Lawrence, T. E.; Palestine; Syria.*

Panathenaea. Festival of ancient Athens. It was held annually in Aug. in honour of Athena. Every fourth year the festival was celebrated on a splendid scale; it was then called the greater Panathenaea, the intervening festivals being known as the lesser Panathenaea. The festival, of legendary origin, had grown by the time of Pericles to great dimensions, and musical and athletic contests were regularly included.

Panay. Sixth in size of the Philippine Islands. The extreme W. island of the Visayan group, it lies between Negros and Mindoro islands, and covers 4,446 sq. m., or with adjacent islands an additional 300 sq. m. Panay has a mountainous surface, ranges extending from the centre to its three corners, with peaks exceeding 5,000 ft., Madias, the culminating summit, being 7,265 ft. The

N. and E. coasts are well indented, and contain several good harbours, Iloilo being one of the finest in the Philippines. The principal rivers are the Jalauro and Jaro. Agriculture is the chief industry, and rice, sugar, and copra are extensively cultivated. Pineapples, bananas, and mangoes are grown. In 1569 the Spaniard Legaspi conquered Panay from his first base at Cebu. From the headquarters he established at Iloilo he proceeded to the conquest of Mindoro and Luzon.

During the Second Great War Panay was in Japanese occupation from May, 1942. Heavily bombed by U.S. carrier-based aircraft in Sept., 1944, it was invaded March 19, 1945, by U.S. infantry who landed 14 m. W. of the capital, Iloilo, achieving a complete surprise of the enemy. Iloilo was captured and all serious opposition overcome March 21. Pop. 800,000. See Iloilo.

Panay Incident. On Dec. 12, 1937, the U.S. gunboat Panay was proceeding up river from Nanking, China, which was being shelled by Japanese guns. When some 25 m. from the city she was sunk by bombs from a Japanese aircraft. Four separate attacks were made, and at the same time three tankers belonging to the Standard Oil co. were set on fire. The U.S. government having sent notes of protest, the Japanese ambassador in Washington broadcast on Dec. 24 an apology for the attack, and on Dec. 29 his country's reply to the protests was received and acknowledged as satisfactory.

Pancake. Thin, flat cake fried in butter or fat. It is made of a thin batter, turned in the pan by tossing. The origin of eating pancakes on Shrove Tuesday, the day before Lent, is a survival of the old custom of feasting on that day, pancakes being fried in the grease that was forbidden in Lent. For 300 years past a ceremony known strictly as the Greaze and popularly as tossing the pancake has been enacted at Westminster School on Shrove Tuesday, the boys scrambling for it and the successful one receiving a guinea from the dean.

Panchatantra (Skt., five books). Oldest known collection of fables. It is the origin of the Fables of Bidpai (*q.v.*) and one of the sources of the Hitopadesa (*q.v.*) or Book of Good Counsels. A work in five tantras or sections, it derives from a treatise in which the ancient Brahmans of India inserted the choicest treasures of

worldly wisdom and the perfect rules for government, and then presented them to their rajahs. Written in Sanskrit, it has been rendered into the chief languages of Asia and Europe.

Panchayat. Name given to the committee that manages the affairs of an Indian village. In some places it consists of the heads of the various households; in others of a fixed number of persons chosen by their fellows. See Village Community.

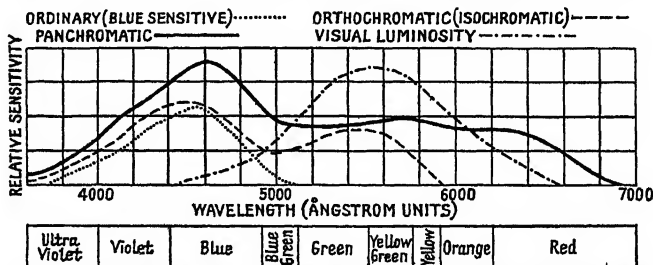
Panch Mahals (five districts). Dist. of India, in the N. division of Bombay. It is a small district, area 1,606 sq. m., bounded W. by the Mahi river. The annual rainfall is 38 ins. Rice and pulses are grown, and native food grains occupy half the tilled area. It has been British since 1853. Administratively it is now combined with Broach. Pop. 924,527.

Panchromatic Photography. Panchromatic emulsions are sensitive to all colours; but not in

It has two ruined castles, and gives its name to the Garganta or gorge of Pancorbo, a rocky ravine in the Pyrenees, leading to Castile. Pop. 1,300.

Pancras. Patron saint of children. He is said traditionally to have been born at Synnada, in Phrygia, of noble parentage, and to have been taken in childhood to Rome, where he was baptized by the pope. During Diocletian's persecution he was asked by the emperor to give up Christianity, and on refusing was beheaded at the age of 14. His festival is May 12, which makes him one of the Ice Saints (*q.v.*). Numerous churches and a London borough are named after him. See St. Pancras.

Pancratium (Gr. *pan*, all; *kratos*, strength). Event in the Olympic and other games of ancient Greece. The term means a comprehensive contest, wrestling and boxing combined. It was a trial of strength in which the two unarmed competitors were at



Panchromatic Photography. Diagram showing the relative sensitivity of photographic emulsions to the colours of the spectrum as compared with the sensitivity of the human eye

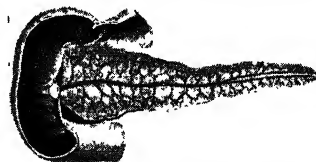
the same proportions as the human eye, which perceives a greater visual luminosity in the yellow-green region than any photographic emulsion unless the latter is balanced by the use of correction filters. Panchromatic plates are usually most sensitive to blue, but many fast varieties achieve their great speed by oversensitiveness to the red end of the spectrum, and so are better suited to half-watt tungsten light than to daylight. This makes them valuable in artificial light and out of doors at morning and evening. The greatest value of the panchromatic emulsion, however, lies in the fact that by the use of correction or contrast colour filters any colour in the subject may be accentuated or subdued at will. See Colour Filter.

Pancorbo. Village of Spain, in Burgos prov. It is 124 m. S.W. of Irún and stands on the Ebro.

liberty to use any means, even strangulation. See Ludi.

Pancratium. Genus of bulbous herbs of the family Amaryllidaceae. Natives of the Mediterranean region, the Canaries, and W. Indies, they have strap-shaped leaves and large funnel-shaped, fragrant white flowers, forming a large umbel, on a tall stem. *P. illyricum* and *P. maritimum* are natives of S. Europe.

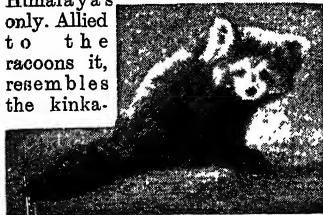
Pancreas. Organ situated behind the stomach. About 6 to 8 ins. long, it contains a duct which opens into the second part of the duodenum in contact with the common bile duct. The pancreas



Pancreas. The organ shown in section

secretes a juice which plays an important part in the digestion of food. It contains four enzymes or ferments, namely trypsin, which splits up the proteins of the food; amylase, which converts starch into maltose, a form of sugar; lipase, which splits up fats; and an enzyme which causes milk to curdle. The pancreas of sheep is called sweetbread (*q.v.*).

Panda OR **WAAH** (*Aelurus fulgens*). Small mammal of the order Carnivora. It is a native of the Himalayas only. Allied to the racoons it, resembles the kinkadee.



Panda. Small Himalayan cat-bear allied to the racoons.
W. S. Berridge, F.Z.S.

jou (*q.v.*) in having the claws partially retractile. Its total length is about 2½ ft., but somewhat more than half this measurement is due to the long bushy tail, which has suggested the alternative name of cat-bear. Its fine, dense coat of fur is chestnut-brown above and black beneath. Mainly nocturnal and arboreal in habits, it is found on the outskirts of the pine-woods. See Giant Panda.

Pandanaceae. Family of trees and shrubs. They are natives of the tropics, mainly of the Old



Pandanaceae. Leaves of the Screw Pine, *Pandanus utilis*

World, and have long, narrow, rigid leaves, the bases of the older ones sheathing the younger. The small flowers are in crowded clusters, the two sexes on separate plants. There are only two genera, *Freyinetia*, climbing shrubs, and *Pandanus*, the screw pines.

Pandarus. In Greek legend, a Lycian archer, who fought for Troy and was slain by Diomedes.

From the part he plays as a go-between in the story of Troilus and Cressida as told by Boccaccio, Chaucer, and Shakespeare is derived the word pander.

Pandean Pipes OR **PAN'S PIPES.** Simple musical instrument of extreme antiquity. It consists of a row of tubes, stopped at their lower ends and bound together, and blown across their tops by the performer. The number of tubes has varied, and the larger instruments are capable of considerable effects, though in England chiefly associated with Punch and Judy shows.

Pandect (Gr. *pandektēs*, all-receiver; *pan*, all; *dekhesthai*, to receive). Term apparently first applied to an encyclopedic work. In the plural, it is specially used of the digest or analysis of the works and legal opinions of the classical Roman jurists, the chief of whom were Papinian and Ulpian, which had been approved by earlier emperors. This digest was in 50 books, and was compiled at the instance of the emperor Justinian. With the Institutes and the Codex the Pandects formed the Corpus Juris Civilis, a complete system of Roman civil law. See Roman Law.

Pandemic. Term for an epidemic on a vast scale, attacking a large area such as a continent.

Pando. Department of Bolivia. It is situated in the N.W. corner of the country on the Brazilian frontier and has an area of 32,405 sq. m., pop. 18,300 and is one of the three low-lying depts. The capital is Cobija (pop. 5,000).

Pandora (Gr., all-gifted). In Greek mythology, the first woman on earth, made from clay by the god Hephaestus at the command of Zeus, who desired to avenge himself on Prometheus (*q.v.*). The gods were so pleased with the result of the skill of Hephaestus that they vied with each other in endowing her with various physical and mental gifts. Pandora became the wife of Epimetheus, brother of Prometheus. In his house was a box which he had been forbidden to open, but Pandora, overcome by curiosity, opened the box, and let out all the evils that afflict mankind. She shut the box in time to prevent the escape of Hope.

Pandour. Term formerly used to designate members of a body of Austrian infantry, first recruited near the village of Pandur, in S. Hungary. They were noted for their savage methods of warfare. The word is extended to indicate robbers and marauders.

Pandulf (d. 1226). Papal legate. Of Roman birth, he early entered

the service of Innocent III and first appeared in England, on a mission from the pope, in 1211. On his next visit, in 1213, John made complete submission to the pope; and at Runnymede Pandulf took the king's side, repudiating Magna Carta, and ordered the suspension of Archbishop Langton for refusing to carry out the papal sentences. In the same year he was elected bishop of Norwich. Made papal legate in 1218, Pandulf soon became the virtual ruler of England. In 1221 he returned to Rome, and died Sept. 16, 1226.

Panel (Old Fr., a little sheet). In English law, the list of jurors returned by the sheriff to serve at a trial. Hence a jury is said to be empanelled. In Scots law, the accused in a criminal trial is called the panel. The word is generally used for any list of names from which a choice can be made.

Panelling. Covering of a surface in a building, such as a wall, door, or ceiling, formerly with panels, *i.e.* raised or sunk compartments, usually framed at the edges. The material used is wood, stone, or plaster. In the past the division of a plaster ceiling by breaking it up into panels has been a favourite form of decoration. Wood panelling, as a mural decoration, was introduced into England in the 15th century.

In Elizabethan and Jacobean work the small wood panel appears, sometimes with a coloured inlay, and with gradually increasing elaboration of the mouldings. Ceiling plaster panels become correspondingly rich. The size of wood panels was greatly increased after the middle of the 17th century, developing into the long oblong of the Palladian style, with very much bolder mouldings. The Italians of the Renaissance panelled both the inside and outside of their buildings with stone or marble, and the use of these materials was adopted sometimes by Wren (*q.v.*) in England. The classic taste of Robert Adam reduced the panel in the 18th century to more reasonable proportions, especially in the treatment of doors; the moulding was simplified, and it became the fashion to paint panels white or cream.

The introduction of plywood towards the end of the 19th century revolutionised interior decoration. While the word panelling remained in use, a principal object of the architect was to eliminate the panel. Veneered plywood was often used to cover completely walls of large area in one plane,

except for a protecting skirting, and possibly an unobtrusive cornice. The aesthetic appeal was thus found in large unbroken surfaces, the beauty of the veneer's figure and colour, and perfect craftsmanship. See Ceiling; Gibbons, Grinling; Mahomedan Art; Mural Decoration. Walter Coventon

Pangani. Dist., river, and town of E. Africa, in Tanganyika Territory. The dist. lies S. of the Tanga and Wilhelmstal districts and N. of the Bagamoyo district, and borders on the E. upon the Indian Ocean. The town is situated at the mouth of the river and has a considerable maritime trade. The river is navigable over considerable distances for small craft. Pangani is also the name of two Falls, one on the Pangani, and the other on the Rufiji river, below its junction with the Ruaha.

Pange Lingua (Lat. *pangere*, to record; *lingua*, tongue). First words, used as the name, of a Latin hymn in honour of the Holy Eucharist. Composed by S. Thomas Aquinas, it begins, *Pange, lingua, gloriosi corporis mysterium* (Now, my tongue, the mystery telling Of the glorious body, sing), and was appointed for the feast of Corpus Christi in the Sarum, Hereford, York, Aberdeen, and Paris breviaries. It was translated into English by E. Caswall and J. M. Neale. See Aquinas, Thomas; Corpus Christi; Tantum Ergo.

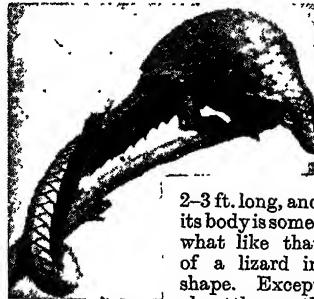
Pangenesis (Gr. *pan*, all; *genesis*, generation). Theory of heredity formulated by Darwin in 1868 as a provisional hypothesis. It endeavoured to satisfy the claims of the doctrine of Lamarck to the effect that acquired characters were transmitted to offspring. It was an effort to understand how characters could be continued from one generation to another. Darwin supposed that the cells composing the tissues of the body gave off minute portions of themselves—"gemmules," he termed them—and that these found their way to the germinal area and constituted the germ-plasm from which the next generation was to spring. The discovery of the part played by chromosomes in heredity rendered this hypothesis unnecessary. See Evolution; Heredity.

Pan-Germanism. International term adopted to describe originally the *Alldeutscher Verband* and the imperialist movement represented by it; subsequently the whole imperialist and militarist German policy, including that of the Nazi movement. The *Alldeutscher Verband*, founded in 1891

and claiming the inheritance of Bismarck's ideas (which, however, were essentially Little German in outlook), was officially meant to foster cultural contact with Germans under other European rule. It preached in fact German expansion by threat or actual making of war, and predominance in the E. and S.E. Particularly active just before and during the First Great War, it claimed Bernhardt (*q.v.*) as a protagonist, and in the Fatherland party, formed 1917 by Tirpitz (*q.v.*), found its political expression. Though originally backed mainly by extreme conservatives, and parts of the upper classes, the Pan-German movement was revived and developed by Hitler. See Germans Abroad.

Pangloss, Doctor. Character in Voltaire's *Candide* (1759). This brilliantly conceived figure of satire, with his many inconsistencies, quotes Leibniz's famous maxim that "all is for the best in the best of all possible worlds," but applies it with little or no justification.

Pangolin (Manis). Genus of edentate mammals, occurring in S. Asia and Africa. The pangolin is



Pangolin, the African species

2-3 ft. long, and its body is somewhat like that of a lizard in shape. Except about the mouth and on the under parts, it is entirely covered with large horny scales; and the feet are provided with strong and powerful claws. No teeth are present, but there are horny ridges on the lower jaws; the tongue is long and wormlike, as in the anteaters. The pangolin rolls itself into a ball when disturbed.

Asiatic pangolins, which comprise three species, live in crevices of the rocks, and in long burrows terminating in a chamber sometimes as much as 6 ft. across. The animals are strictly nocturnal, and feed on termites. There are four species in Africa. They resemble the Asiatic species in habits, but have a curious method of resting on a tree-trunk by clinging with the hind feet and tail, while the

body is thrown back till it is nearly horizontal.

Panick Grass (*Panicum*). A large genus of grasses of the family Gramineae. They are mostly



Panick Grass. Leaves and flower spray of *Panicum miliaceum*

natives of the tropics, but a few are widely distributed in temperate regions. The flowers are clustered in spikes or branching sprays. Many species are useful fodder grasses, and a few of them yield grains large enough for use as human food. *P. miliaceum*, which yields Indian millet or warree, is cultivated in S. Europe. *P. maximum* of the W. Indies attains a height of 6-10 ft., and another large species is the Angola grass (*P. spectabile*) of Brazil. Several are grown as ornamental grasses.

Panicle (Lat.). In botany, term denoting the arrangement of the flowers in a raceme or spray with branches, as in the oat. See Inflorescence.

Panipat. Town of Punjab state, India, in Karnal dist. It is situated about 50 m. by rly. N. of Delhi and W. of the Jumna. Decisive battles were fought here in 1526, when Babar (*q.v.*) triumphed; in 1556, when a victory placed Akbar on the throne of Delhi; and in 1761, when Ahmad Shah of Afghanistan defeated the Mahrattas. Pop. 37,837.

Pan-Islamism. Concept of a union of Muslim powers opposed to the Christian powers of Europe. The expression dates from the 1880s, when this was regarded as something new and threatening; but in fact Muslim political theory has always embodied hostility to unbelievers. Pan-Islamism was bound up with the efforts of the Turkish sultan Abdul Hamid II to win recognition as caliph and spiritual head of all Muslims. The movement declined with the prestige of Turkey. By 1919 it was kept alive only by the Khilafat movement in India, and virtually perished with the caliphate in 1923.

Panixer. An Alpine pass in Switzerland. It connects cantons Glarus and Grisons over the Tödi range, and leads E. of the Hausstock from the valley of the Sernf to Panix on a small affluent of the Vorder Rhine. Its alt. is 7,897 ft. and the top is marked by two tablets which record the retreat, Oct. 5-10, 1799, of the Russians under Suvorov.

Panjandrum. Nonsense word made up by S. Foote, and occurring in a fantastic composition intended as a memory test. A sentence frequently quoted is as follows: And there were present the Picinnies, and the Jobillies, and the Garyulies, and the Grand Panjandrum himself, with the little round button at top. Hence the word came to be used by 19th century writers as a synonym for any pretender to undue importance or fussy local magnate.

Panjim. Alternative name for the Indo-Portuguese city of New Goa (*q.v.*).

Pankhurst. Name of a family of English pioneers in the women's suffrage movement. Emmeline (1858-1928), daughter of a calico-printer, Robert Goulden, of Manchester, was born July 14, 1858, and in 1879 married R. M. Pankhurst (*d.1898*), a barrister who drafted the Married Women's Property Act of 1882, with whom she helped to found the Women's Franchise League in 1889. She joined the Independent Labour party in 1892, founded the Women's Social and Political Union in 1903, and was the leader of the militant "suffragettes" until the outbreak of the First Great War in 1914, when she transformed her organization into one of national service. Imprisoned some eight times for sensational activities—inciting to riot, window breaking, assault, and complicity in a bomb outrage on Lloyd George's



Emmeline Pankhurst,
British women's leader
Elliott & Fry

house—she remained undeterred and continued to demonstrate and lecture in England and the U.S.A. In 1918 she joined the Conservative party. She

died June 14, 1928. She wrote *My Own Story*, 1914. Her statue in Victoria Tower Gardens, Westminster, was unveiled 1930.



Sylvia Pankhurst,
British propagandist

Her daughter Christabel (*b.1880*) played a leading part in the suffrage movement from 1905, editing *The Suffragette* and several times undergoing imprisonment. After the granting of the vote to woman in 1918 she devoted herself to a religious movement and preached the immediate second coming of Christ. She was created D.B.E. in 1936.

Mrs. Pankhurst's second daughter Sylvia (*Estelle*) (*b.1882*) was also associated with the suffrage movement, edited *The Workers' Dreadnought* in 1914, and joined a pacifist group. She was sentenced to six months' imprisonment in 1921 for publishing articles calculated to cause sedition. Chairman of the international Ethiopian council for study and report, she did much propaganda on behalf of Abyssinian independence. Her Life of her mother appeared in 1935; she also wrote *The Suffragette Movement*, 1931.

Panna. Town and former state of India, in Bundelkhand. The state is now part of Vindhya union. It is adjacent to Northern dists. of the Madhya union and to the former Kothi state. The town is 105 m. N. of Jubbulpore, and contains several modern Hindu temples. Formerly diamonds were mined in the locality. The state covered 2,580 sq. m. Pop., state, 231,170; town, 14,000.

Panning. Process of concentrating heavy minerals used by prospectors, by miners working placer deposits on a small scale, and for the rough assaying of samples of certain ores. The method is based on the fact that some minerals have higher specific gravities than others and that some heavy ore minerals frequently occur associated with lighter, worthless minerals.

The pan is a circular dish with sloping sides. The average size is 15 ins. in diameter and 2½ ins. deep. The pan, often made of thin steel and sometimes wood, should be light and stiff, with a smooth inner surface.

The pan of gravel is placed in water and the contents thoroughly wetted and stirred by hand to

break up any lumps of clay; the larger stones are picked out. In the water it is given a shaking, circular motion, the lighter minerals working their way to the surface and the heavier settling to the bottom. The lighter minerals are washed off, the heaviest finally remain, and these may be examined for the presence of gold, cassiterite, wolfram, etc. The method is primitive and slow, but extensively used where labour is cheap and the use of machinery uneconomic. Variations are used in S. America, Malaya, India, and Nigeria.

Pannonia. A province of the Roman empire. It lay between the Alps and the Danube, from a point above the modern Vienna to Belgrade, and embraced a large part of the present Austria, Hungary, and Yugoslavia. Its people, who seem to have been of Illyrian race, were defeated, c. 30 B.C., by Vibius, one of the generals of Octavianus. They revolted A.D. 7 and were reconquered by Tiberius.

Panorama (*Gr. pan, all; horama, sight*). Term for a picture giving views of objects in all directions. A panoramic display, which was in a sense the predecessor of the cinematograph, was a picture representing a number of scenes which passed in succession before the audience. See *Cinematography*.

Panos. Family of S. American Indian tribes of allied speech. Mostly in the Pampa del Sacramento, Peru, they are a branch of the Caras, once dominant in Ecuador. Their numbers have dwindled to insignificance.

Pans. In geology, hard layers formed by the consolidation of loose material at depth below the surface of the soil. They interfere with drainage and decrease fertility. A pan simply consisting of hardened clay is known as a plough sole, and may be caused by continuous ploughing of heavy land. In lighter soils the pan is formed by infiltration of various substances in solution, these being deposited and acting like cement. A distinction is thus made between moor-bed pan (organic cement), iron pan (ferrie oxide), and limy pan (carbonate of lime). Pans require breaking up by subsoiling or deep ploughing.

Pan-Slavism. Movement for the unification of all Slavonic nations under Russian leadership. The word appeared first in 1826 in a book by a Slovak, J. Herkel, but its cultural aspect had been outlined in 1794 by a Pole named Staszyc, and elaborated by the



Christabel Pankhurst,
British suffragist

Czech poet Jan Kollar in some widely read sonnets. The movement was fostered by the anti-Western slavophiles in Russia, and exploited by tsarist politicians, mainly for the furthering of aims in the Balkans. Pan-Slavist congresses were held in Prague, 1848, and in Moscow, 1867. The severance of the Poles from the movement, after their revolt of 1863, changed its trend in the late 19th century into neo-slavism, a more liberal concept. In this form it held congresses at Prague, 1908, and Sofia, 1910. Deprived of its fundamental tenets by international Bolshevism, Pan-Slavism again became a live force under the impact of Nazi pan-Germanism, and played a part in Russian policy after the Second Great War.

Pansy (*Viola tricolor*). Perennial herb of the family *Violaceae*. It is a native of Europe, N. Africa, and N. and W. Asia. The leaves in general form are oblong, or lance-shaped, but variously



lobed and out. The flowers are purple, whitish, or yellow, or a varied mixture of the three colours. The number of named varieties is enormous, and every year sees additions. They do well in almost any garden soil, but the best results are obtained by planting deeply in a well-drained sandy loam, enriched with stable or cow manure. Special varieties can be propagated only by means of cuttings and divisions of the old plants, made at the end of Aug. or Sept., and given slight protection in winter. The word pansy is derived from the French *pensée*, thought. Alternative names are heartsease and love-in-idleness.

Pantagruel. Giant and king of the Dipsodes in Rabelais's *Life of Gargantua and the Heroic Deeds of Pantagruel*. He is the son of Gargantua, and his name is explained as signifying all-thirsty.

Pantaloön

(Ital. *Pantaleone*, a saint popular in Venice). Ridiculous old Venetian bourgeois in the Italian comedy, or *Commedia dell'Arte* (*q.v.*). Sometimes he was an old bachelor, but generally he was married to an unfaithful young wife or was the father of troublesome young daughters. Columbine was often his daughter, and Harlequin sometimes his lackey. Lean and slippered, as Shakespeare called him, Pantaloön wore the skin-tight trousers all of one piece named after him, and a long gaberdine, originally red, but changed to black when Venice lost Negroponte and the whole city put on mourning. In traditional English pantomime he is a butt for the practical jokes of harlequin and clown. See Columbine; Harlequin; Pantomime.

Pantellaria. Volcanic island of the Mediterranean. Situated 80 m. S. of Sicily and 40 m. N. of Tunisia, it has an area of 32 sq. m., and forms part of the prov. of Trapani. A dependency of Sicily (*q.v.*), it has a similar history. There is an extinct crater, *Montagna Grande*, 2,740 ft. high; numerous fumaroles and hot springs exist; in 1891 a submarine eruption occurred 3 m. to the N.W. Raisins and figs are produced, and fishing is engaged in. Round towers, known as *Sesi*, betoken a prehistoric population.

Pantellaria was colonised by the Phoenicians and captured by Rome in 217 B.C. The Christian inhabitants were exterminated by the Arabs about 700.

Bombed from the air by the Allies, with scarcely a day's respite, from May 9, 1943, and frequently also bombarded from the sea, Pantellaria surrendered unconditionally June 11 without the necessity of an Allied landing.



Pantaloön, in English pantomime

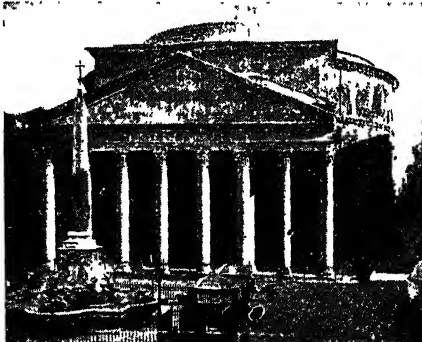
Under the peace treaty between the Allies and Italy, 1947, Pantellaria was to be demilitarised.

Panthay. Burmese name for Chinese Mahomedans, especially in Yunnan. Calling themselves Hui-hui, they are presumably descendants of medieval Tartar soldiery. Official oppression led in 1855 to a rebellion under Tu Wenhshui, who was proclaimed sultan, 1867, but overthrown, 1873. Panthay muleteers serve the caravan trade between Burma and China.

Pantheism (Gr. *pan*, all; *theos*, god). The doctrine which affirms the unity of the Deity with the world. Pantheism has received different names according to its attitude towards the relation of individual things to the absolute. Acosmism denies the existence of a universe as distinct from God; emanationism explains all things as flowing out from the Deity, of whom they form part; Krause's pantheism teaches that all things are in God.

A fundamental part of much ancient Indian philosophy, pantheism appears in the Greek Eleatic and Neoplatonic systems, and in many Christian mystics from the so-called Dionysius the Areopagite onwards. It was taught by Bruno and other Italians of the Renaissance, and by many German Idealists. It is most completely developed in the philosophy of Spinoza. See God; Spinoza.

Pantheon (Gr. *pantheon*, belonging to all the gods). Temple in Rome, now a church. One of the most celebrated of ancient Roman buildings that still survive, it was built by Hadrian between A.D. 120-130. An early temple near the site was built by Agrippa in 27 B.C., as a memorial to the house of Caesar, and was burnt A.D. 80. The main structural parts of the Pantheon consist of a rotunda and a dome, the interior of the latter



Pantheon. Portico of the ancient Roman temple built by Hadrian and now used as a church



Pansy. The two-coloured variety. Left, the common yellow pansy

forming a perfect hemisphere, the total height and diameter of the building amounting to 142 ft. 6 ins. The portico of Corinthian columns supports a massive pediment (*q.v.*) surmounted by another partially screening the dome, which is constructed of solid concrete and lighted at the summit by an opening 27 ft. in diameter. Originally the dome was covered with tiles of gilded bronze, but these were removed by Constantine II, a leaden covering being substituted by Pope Gregory III. The interior is lined with marble. In 609 the Pantheon was consecrated by Boniface IV, and dedicated to S. Mary of the Martyrs. It contains the tombs and monuments of eminent Italians.

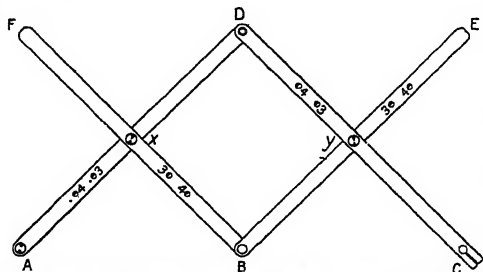
The Panthéon, Paris, a building in the Roman style, with a large portico and a dome, designed by Soufflot, was begun in 1764, and has been three times a church, dedicated to S. Geneviève, and three times, as now, a temple of honour to great Frenchmen, of whom Voltaire, Rousseau, and Hugo are buried in the crypt.

Panther (*Felis pardus*). Large and ferocious spotted cat. It is a native of Africa, S. Asia, Java, and Japan, about 7 ft. in length. Its upper parts are yellow closely spotted with black, paling to white on the under surface. The spots vary in form from broken rings and ovals to short longitudinal bars and blotches. Generally known in India as the panther, in other parts of its distribution it is called leopard (*q.v.*).

Pantin. Town of France, in the dept. of Seine. An industrial suburb of Paris, it lies just outside the fortifications, 1 m. N.E. of the city. The Ourcq canal runs past it, and the industries include rly. wagon factories, the making of chocolate, soap, preserves, and perfumery, distilleries, dyeworks, and some stone quarries. Although an old town, mentioned as Pentium in the 11th century, Pantin has no points of outstanding interest. Pop. 36,212.

Pantograph. Instrument for copying designs on a larger or a reduced scale. Its principle is shown by the accompanying illustration. A D, D C and B F, B E are two pairs of rods of equal length, hinged together at D and B respectively, and attached by removable screws at *x* and *y*. The apparatus is secured to the board by a single spike at A, about which it can be moved freely in any direction. All four rods have a series of holes in them, and by set-

ting the screws in similarly-numbered] holes the sides D *x*, B *y* of the parallelogram B *x* D *y* may be made equal to, longer than,



Pantograph for copying designs on different scales. See text

or shorter than the sides B *x*, D *y*. The longer D *x* is relatively to D *y*, the greater will be the movements of C relatively to those of B. If the reproduction is to be larger than the original, a pencil is inserted at C and a tracing stylus at B; if smaller, the positions are reversed.

Pantomime. Art of acting without words, by gestures and facial expression only. Though practised in ancient Greece, it became more popular in Rome, where it had the great advantage of supplying an entertainment intelligible to the cosmopolitan crowd that lived there. Facial expression, however, was excluded in those days because of the masks worn by the performers—contrivances of bark, leather, or metal, lined with cloth, which covered the entire head. In the 17th and 18th centuries the word pantomime was applied in France to a kind of mythological ballet which was in great favour in Paris and at Versailles. Nowadays the word is chiefly used for spectacular Christmas theatrical productions which first became popular in Great Britain during the 19th century and have developed unique traditions of their own. Originally they were a combination of familiar fairy story with ballet and harlequinade, introducing the stock characters of Harlequin, Columbine, Pantaloon, and Clown, and traditional "business" with sausages and red-hot poker. The fairy story element was gradually strengthened at the expense of the other two, the ballet becoming a special feature at the end of the first half, and the harlequinade concluding the whole performance. The harlequinade has now almost disappeared. For a time it was the vogue to combine two or more fairy stories with burlesque effect, as seen still in the tradition which

combines Robin Hood with the Babes in the Wood. The stories were never much more than a flimsy basis for a riot of song, dance, and comic business, which became increasingly sophisticated and vulgarised. Certain features have become characteristic, *e.g.* the masquerading of a woman as "principal boy" and of a man as an elderly widow, or "dame"; the inclusion of fairy

and demon as supernatural protagonists; the grand parade finale with all the performers entering in ascending order of importance to receive their applause. Stock characters like Idle Jack (Dick Whittington), Dandini and Buttons (Cinderella), and Pekoe and Widow Twankey (Aladdin), owe their whole existence to pantomime. The names of the last two were taken from popular brands of China tea in mid-19th century, Twankey being Twan-kee. Drury Lane theatre was long famous for the elaborate nature of its Christmas pantomimes, as were certain theatres in the north of England and in Scotland, *e.g.* the Grand, Leeds, and the Prince's, Glasgow, where the productions often run well into the spring.

Panzer (Ger., coat of mail, iron-clad). Name given to the German armoured division in the Second Great War. The term Panzer division was first used by the Austrian Gen. Eimannsberg in his book Tank War, 1934, which became a German general staff textbook. Although its composition varied according to operational conditions, the division normally consisted of: two tank regiments of three battalions each, totalling 468 light, medium, and heavy tanks; three battalions of motorised infantry; a battalion of 50 armoured cars; a battery of 24 self-propelled guns; another of 24 A.A. guns; an anti-tank battery of 36 guns; two battalions of engineers; one of signals; 12 reconnaissance aircraft and 32 dive-bombers. The purpose of the Panzer division was to act as the spearhead of attack, its mobility enabling it to exploit any weakness in the enemy defence.

Paoli, PASQUALE (1725-1807). Corsican patriot. Born April 25, 1725, son of the Corsican leader, Giacinto Paoli, he was educated

at Naples, where his father commanded a regiment of Corsican exiles. In 1755 Pasquale was offered the supreme power in Corsica, where he consolidated the Corsicans by making vendettas unlawful, and provided a generous constitution. When, in 1768,



Pasquale Paoli,
Corsican patriot

Corsica was ceded by Genoa to France, Paoli offered a fierce resistance, but he was compelled to leave the island with 350 followers on a British frigate, June 12, 1769. He settled in London, received a pension, and joined the circle of Dr. Johnson. By a vote of the National Assembly of France, Nov. 30, 1789, he was allowed to return to Corsica, which he again governed. He defied the French, and British troops were sent to his aid, in return for which he handed over the sovereignty of Corsica to George III. The British evacuated it in 1796. Paoli returned to London, 1795, and died there Feb. 5, 1807. See Corsica.

Paolo and Francesca (d. 1285). Lovers celebrated by Dante, who meets them in the second circle of Hell (*Inferno*, v). Giovanni Malatesta of Rimini, who was lame and ugly, received from the lord of Ravenna, as a reward for his military services, the hand of his beautiful daughter, Francesca (q.v.). She loved his brother Paolo, and was surprised with him by her husband, who slew them both. The story is the subject of a tragedy by Stephen Phillips, produced March 6, 1902, at the St. James's Theatre, London, where it ran for 136 performances. Henry Ainley played Paolo; George Alexander, Malatesta; Elizabeth Robins, Lucrezia; and Evelyn Millard, Francesca. See Francesca.

Papa. Latin form of the Greek *pappas* or *papas*, father. In origin and in ordinary usage the word is a child's name for father. It was an early title of bishops, e.g. S. Jerome refers to S. Cyprian as *Beatissimus papa*. Since the time of Gregory VII (1073-85) it has been claimed as the prescriptive title of the bishop of Rome. In the Greek Church the word denotes a priest. See Pope.

THE PAPACY: HISTORICAL OUTLINE

Canon W. F. Barry, D.D., Author of *The Papal Monarchy*

This article is supplemented by one on the Roman Catholic Church. See also the biographies of the Popes and the entries on the Councils; also Curia; Investiture; Pope; Rome; Vatican, etc.

No dynasty of rulers or lawgivers left standing in Europe today is as old as the papacy; none, perhaps, in the world except that of Japan.



Papacy, shield on which each pope emblazons his arms

In legal documents issuing from his court the pope is termed bishop of Rome, successor of S. Peter, Pontifex Maximus and Vicar of Christ. He holds many more titles, but they all flow from one; for he is the Roman Father, emphatically such, and this Virgilian appellation (*Aeneid* ix, 449) prefigures an empire without end, visible in its throne of majesty, but something higher still, because the gift of Heaven. If S. Peter was prince of the Apostles, yet imperial Caesar was head of the college of Pontiffs, a priest who could offer sacrifice and edit or interpret the Sibylline books. This very ancient mingling of attributes in a priest-king was familiar to Jews and Christians, who venerated Melchizedek, king

of Salem, priest of the Most High God.

The Apostle Peter came to Rome, according to tradition, in A.D. 42, and in whatever year he suffered martyrdom, it is certain that his Confession became a place of pilgrimage from all parts of the empire, as Caius the priest bears witness at the beginning of the 3rd century. Reference to the good Apostles in S. Clement's epistle, about A.D. 94, and an implication of their heroic end, confirm the association of Peter and Paul with Roman Christianity; but succession to the bishopric is never derived from the teacher of the Gentiles. In the earliest catalogues of the popes a slight derangement leaves the chief links secure. There is no question among scholars of best reputation that Peter died in Rome, where he had exercised supreme authority, and had designated Linus or Clement to succeed him as bishop.

Need for a Universal Religion

When Nero put to death an immense multitude of Christians in A.D. 64, the new and spiritual Rome, which was to rise upon the ruin of republic and empire, celebrated her birthday. When, again,

Titus destroyed Jerusalem, its prerogatives could not fail to be transferred elsewhere; and what city enjoyed an equal greatness with the world's capital, sanctified by the memories of Peter and Paul? Moreover, the unity of the empire demanded a universal religion which might absorb or supersede the many local gods, rites, and temples in East and West. From Egypt came the Isis worship, from Persia that of Mithras; both were tried by large numbers, only to be found wanting; and the field lay open to Christianity, which inherited the promises made to Judaism, while divesting them of its burdensome restrictions.

Identification with Rome

From S. Clement to S. Sylvester 90-313, the movement went forward, quickened by the "ten persecutions"; for, as Tertullian knew, "the blood of martyrs is the seed of the Church." At last Caesar made terms with Peter; the great Constantine saw victory in the Cross and wove it into his standard. Jupiter Capitolinus abdicated; the Vatican became, in S. Jerome's language, the "Roman height"; a fresh capital was set up on the shores of the Bosphorus; and the heirs of Augustan Rome quitted the Tiber, to which they never returned, A.D. 324. From now on, the papacy and the most sacred of world cities were identified in fact as in idea. Old Rome had civilized the West; it fell to the lot of a better dynasty to convert the barbarians, to make the future Christian, and to plant foundations on which European culture, instinct with principles taught in the Gospel, should prove itself to be the dominant power above mankind.

When the Iconoclast emperors lost their hold on Central Italy, the popes were acclaimed deliverers of Rome, and the temporal power, as it is called, began. "Their noblest title," wrote Gibbon, "is the free choice of a people whom they had redeemed from slavery." They could not yet rescue Spain from the Saracens; but on Christmas Day, 800, Leo III crowned Charlemagne in S. Peter's and created the Holy Roman Empire, of which a far-off shadow flitted away in the disappearance of its Austrian successor. The popes made the French monarchy; they converted Ireland, Britain, Central Europe, Poland, Bohemia, and Russia by their missionaries Patrick, Augustine, Boniface, Cyril, and Methodius; they resisted the Franconian and Hohenstaufen emperors, who would have made the Church a department of state; and

they became suzerains of every Western kingdom except France.

The holy war against Mahomedans revealed the same spirit armed for battle. If it began with the conquest of Jerusalem in 1099, it did not cease until 1720, under Clement XI; and it remains the great Christian epic. The genuine Middle Ages came to an end when the 14th century opened with a fatal dispute between Philip the Fair of France and Boniface VIII. No century has been more disastrous to the papacy, captive at Avignon for seventy years, rent by the Great Schism during another forty. The council of Constance (1414-17), which restored visible unity, voted by nations instead of by bishops; and our modern world stood at the door.

Renaissance and Reformation

In 1453 the Turks captured Constantinople. All that we understand by culture fled to the West, and Rome took to herself the glorious task of Athens. A brilliant era came in, with learning, luxury, scandals, catastrophe in its train—Luther's revolt and the sack of Rome. The whole North fell away. England struck out a line of her own; Scotland obeyed Knox, who obeyed Calvin. Then Ignatius of Loyola founded the Jesuits, and Rome got back one-half of what she had lost; but the Thirty Years War, ending in 1648, drew a line which has never been altered since. The last of the great popes were Julius II, Pius V, and Sixtus V.

The principle of nationality, which was to make Italy free and united, ruled throughout the 19th century. The pope's temporal power fell before it. On Sept. 20, 1870, the Porta Pia was blown open by Italian guns; a plebiscite followed, and Rome began to fill the part of a secular capital. The Vatican was left to S. Peter. Yet in Leo XIII a great pope became once more visible, who could compel Bismarck to kneel in spirit at Canossa. The Vatican council had brought together bishops from every region of the globe; and papal infallibility was proclaimed 63 days before Rome capitulated.

For hundreds of years the papacy had been overlord of Europe, controlling the two swords, spiritual and temporal. It is now the head of a world-wide voluntary association, which wields no sword but its faith, and which owes nothing to secular governments. The pope is guardian of a temple not made with hands; in this light, at least, three hundred millions of Catholics regard him. His effective influence,

at present, is more extensive than in any former age, being less hampered by secular considerations, and much more direct in action.

W. F. Barry, D.D.

From 1870 the popes maintained a dignified protest against the spoliation of their territory by remaining within the Vatican and its gardens for 59 years, and by refusing to accept the so-called law of guarantees. Gradually relations between the papacy and the Italian government improved and, to the astonishment of the world, which had regarded the "Roman question" as insoluble, on Feb. 11, 1929, the treaty of the Lateran was signed by the secretary of state, representing Pius XI, and Mussolini, representing the king. The pope gave up all but a minimum of territory, but was acknowledged as an independent sovereign. The limits of the pope's temporal jurisdiction are the Vatican city, including the palace and gardens, S. Peter's basilica and its square, the chief basilicas and certain other buildings in Rome, and Castel Gandolfo where popes sometimes go to escape intense heat in summer. The Vatican city covers 109 acres, has 1,025 inhabitants, and must be the smallest independent state in the world. In spite of some early disagreements the settlement has worked well.

H. W. Acomb

Bibliography. The Formation of Christendom, T. W. Allies, 1865-75; Catholic Church and Christian State, Cardinal Hergenrother, 1876; Latin Christianity, H. H. Milman, 1883; History of the Popes, L. v. Pastor, 1891-1941; History of the City of Rome, F. Gregorovius, Eng. trans. A. Hamilton, 1894-1902; History of the Papacy, M. Creighton, 1897; Ave Roma Immortalis, F. M. Crawford, 1898; Renaissance Types, W. S. Lilly, 1901; Lives of the Popes in the Early Middle Ages, H. K. Mann, 1902-32; The Holy Roman Empire, Lord Bryce, rev. ed. 1904; History of the Popes, L. v. Ranke, Eng. trans. E. Foster, 1908; The Papacy and Modern Times, W. F. Barry, 1911.

Papain. Vegetable ferment present in the milky juice of the unripe fruit of *Carica papaya* (papaw, *q.v.*). Papain occurs in commerce as a fine greyish powder with a characteristic odour and sweetish taste. It is a proteolytic enzyme intermediate in action between pepsin and trypsin, and has been given as a digestive.

Papal States or STATES OF THE CHURCH. Name given to the Italian territories which were under the temporal sovereignty of the popes. Differing at different periods, they

generally formed a solid strip of territory running across Italy and bounded N.W. and N. by Tuscany, Modena, and the Po, and S.E. by the kingdom of Naples, the nucleus being the Roman patrimony of S. Peter and the exarchate of Ravenna, extorted from the Lombard kingdom by Pepin and given by him to Pope Stephen II in 755.

Through the Middle Ages the regions in which the pope was able to exercise temporal sovereignty varied greatly, reaching their maximum under Innocent III (1198-1216). The annexations of Ravenna, Ancona, Bologna, Ferrara, Perugia, etc., date from the 16th century. Submerged under Napoleon's ascendancy, the Papal States reappeared in 1814, and received a constitution in 1849. The formation of the kingdom of Italy in 1860 reduced them to the comarca of Rome, the legation of Velletri, and the delegations of Viterbo, Frosinone, and Civita Vecchia. These being absorbed in 1870, the popes thereafter remained as self-constituted prisoners in the Vatican, until the Lateran treaty between the Holy See and Italy, Feb. 11, 1929, recognized the pope as sovereign of a clearly defined territory, the Vatican city. See Papacy.

Papal University. Ecclesiastical educational institution in Rome. It consists of three colleges: the pontifical, founded by S. Ignatius Loyola in 1550; the biblical, founded in 1909; and the oriental, founded in 1917. The three colleges, called collectively the Pontifical Gregorian university, are under the direction of the society of Jesus; they prepare candidates for the priesthood. The buildings are outside the Vatican city, but since the concordat with Italy of 1929 have enjoyed extraterritorial rights in relation to the Holy See.

Papaveraceae. Name given to the poppy family. It forms a family of herbs and a few small shrubs with milky or coloured juice, chiefly natives of the N. temperate regions. They have alternate leaves on their stalks. There are only two sepals, which are thrown off when the four crumpled, silky petals expand. The seed capsule either is like the familiar poppy head of the druggists' shops, opening when ripe by pores just beneath the broad-lobed stigma to release the innumerable small seeds, or is a long, slender, cylinder opening by a long valve on each side. *Papaver somniferum* yields opium from its milky juice;

its seeds, which are not narcotic, are the maw-seed of the bird-fancier. *See* Opium; Poppy.

Papaw (*Carica papaya*). Small evergreen tree of the family Caricaceae. A native of S. America, it has large, alternate, seven-lobed leaves, the segments themselves being deeply lobed. The greenish flowers are either male or female, and the two kinds are often on separate trees. The dingy, orange-coloured fruit is an elongated oval nearly a foot long, with fleshy gourd-like rind enclosing five rows of



Papaw tree laden with fruit

small black seeds. It is eaten after being boiled or pickled. It yields the proteid-ferment papain.

Papeete. Capital and seaport of the Society Islands. Situated on the N.W. coast of Tahiti, it contains the residence of the French governor. Pop. 11,614.

Papen, FRANZ VON (b. 1879). German politician. Of a family belonging to the R.C. aristocracy, he was born at Werl, Westphalia, Oct. 29, 1879. At the outbreak of the First Great War he was military attaché in Mexico; being transferred to Washington



Franz von Papen, German politician

he became an active German agent, organizing plots to impede the output of munitions for the Allies; but after losing incriminating documents he was sent home. A member of the centre in the Prussian diet, 1921-28, he became German chancellor in June, 1932, but after the Nazis had obtained an electoral majority he resigned on Nov. 17.

Papen helped the Nazis to power in the belief that he could direct them as vice-chancellor, and narrowly escaped Hitler's purge in 1934. Ambassador to Vienna, in 1938 he helped to bring about Schuschnigg's downfall, and during the Second Great War as ambassador to Ankara he furthered German designs in the Balkans. After his country's defeat he was brought to trial before the Allied court at Nuremberg as a war criminal and acquitted. Immedi-

ately arrested by the Germans, he was in 1947 sentenced to eight years in a labour camp. Released on appeal, 1949, he was still debarred from political or public activity.

Paper. Material on which records are kept by means of symbols made with ink. Man first recorded his thoughts and actions by carving hieroglyphics in rock and stone, then he used metal slabs, waxed boards, clay tablets, cured reptile and animal skins, papyrus and parchment, the last two direct forerunners of paper. (*See* Papyri.) Parchment, made from sheep and goat skin, came into vogue when the export of Egyptian papyrus was prohibited. It was very popular in the Middle Ages and has continued in use for important legal documents.

HISTORY. Paper (a word derived from papyrus) is a deposit of vegetable fibre prepared from an aqueous suspension. It was first produced, from bark, tow, and old linen, by Ts'ai-Lun, a Chinese minister, in A.D. 105. The process was kept secret for hundreds of years until some Chinese paper-makers were captured in 751 by Moors and Arabs and forced to divulge their knowledge. Linen formed the basic raw material in Bagdad paper mills, and as early as 1035 Arab merchants were wrapping their wares in paper. In the 12th century the art of papermaking reached Spain, coming a little later to Italy, France, and the Netherlands.

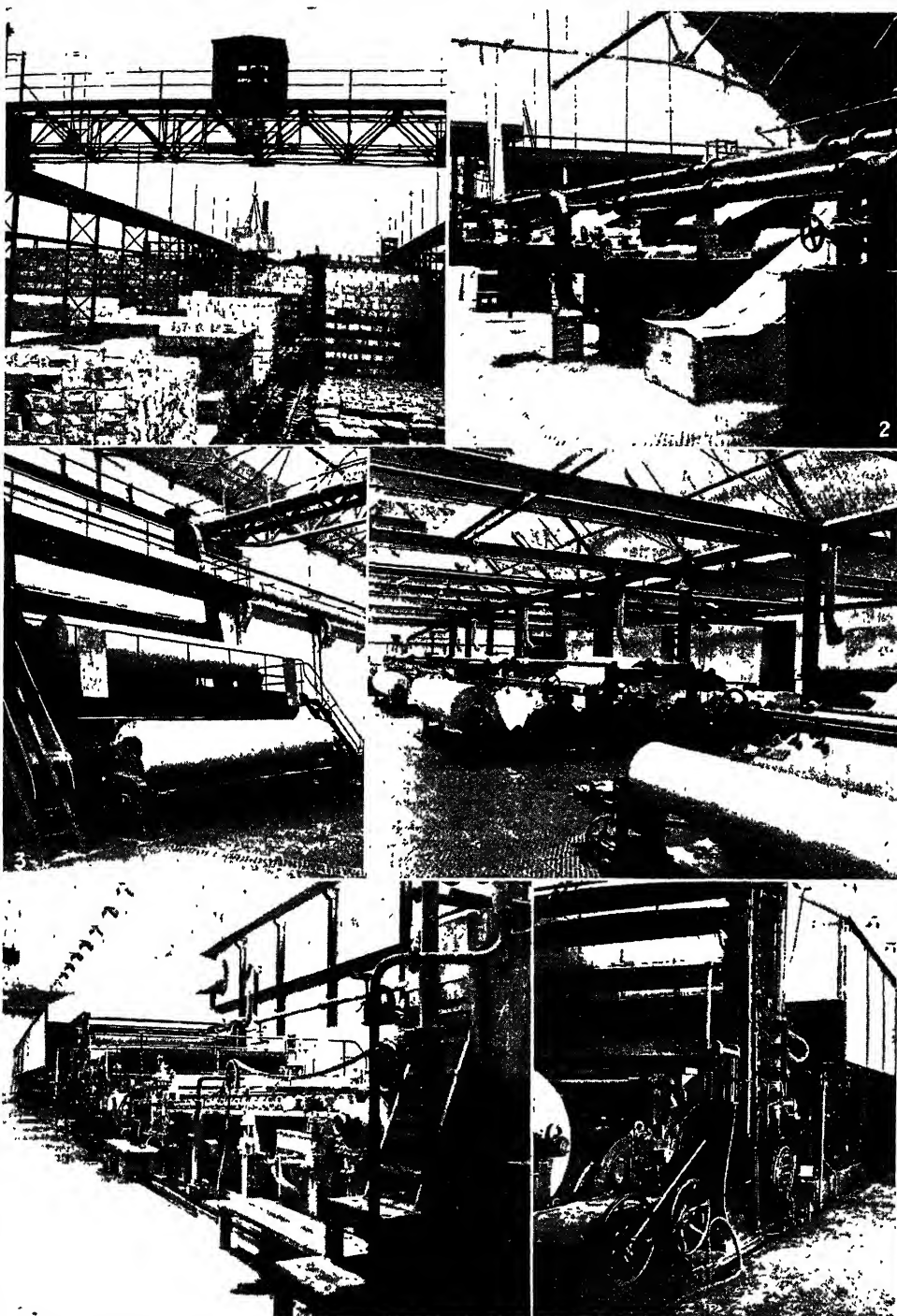
After a mill was started in Hainault (Flanders) in 1189, the industry rapidly spread throughout the Continent. The first English mill was opened in 1496 by John Tate at Hertford. Cotton and linen rags were moistened, and after fermentation and washing were "beaten" to pulp in stamping machines, rather like mechanical pestles and mortars. After Tate's time, papermaking fell into comparative desuetude in England until de Portal took up his monopoly of making paper at Laverstoke for Bank of England notes in 1725; the famous Whatman mills were founded in 1740. In the meantime, the industry had been making great strides in the Netherlands, where the Hollander beating engine, invented in 1680, was followed by Louis Robert's invention of the paper machine at Essonne in 1798. A few years later the Fourdrinier brothers, of London, financed Bryan Donkin's first paper machine at Two Waters Mill, Hertford, in 1803. John

Dickinson invented the cylinder vat machine in 1809, drying cylinders were added to the Fourdrinier machine in 1821, suction pumps and the dandy roll followed, and by 1831 the prototype of the machine of the 20th century appeared.

The discovery of the bleaching action of chlorine by Berthollet and the cheapening of soda manufacture by Leblanc at the turn of the 18th century made it possible to prepare cellulose pulp cheaply from a wide range of fibrous materials. Koops used straw pulp in 1800, Routledge used esparto in 1852 and bamboo in 1875, and about 1855 in the U.S.A. brown wrapping paper was made from the linen shrouds taken from shiploads of Egyptian mummies. From his observation of the fibrous construction of wasps' nests, Réaumur concluded that paper could be manufactured from wood, and in 1840 Keller first introduced ground wood pulp. This, with Tilghman's invention of the sulphite wood-pulp process in 1866, made possible the production of the huge quantities of newsprint consumed by the press of the world.

MANUFACTURE. Cotton and linen rags, which yield virtually pure cellulose, are still extensively used for paper making; they yield high grade handmade and machine-made papers of great durability. Esparto grass, straw, bamboo, hemp, jute, and waste paper are all valuable sources of fibre, and much of the paper in everyday use is made of wood fibre from the coniferous forests of Scandinavia and N. America. Deciduous or hard woods such as poplar and birch have been used, and the search for new sources of fibre goes on continuously.

In making handmade paper cotton and linen rags and new white cuttings from the textile mills are sorted carefully, cut and dusted, and then digested with alkali under pressure. Partial disintegration in a breaking machine is followed by washing and bleaching to reach the "half-stuff" stage. The half-stuff is reduced by the beater to ultimate fibres, the individual fibres being separated, fibrillated, and shortened. The manner and duration of beating govern the properties of the finished stock. The beater is a heavy roll fitted with steel or bronze knives or bars. The roll is housed in an oblong trough with rounded ends and rotates with a peripheral speed of about 2,000 ft. per min. over a bedplate, which is fitted with bars. The



1. Stacks of wood pulp in bales waiting to be turned into paper. 2. Beaters, in which the wood pulp is treated before passing to the paper-making machines. 3. A super-calender which imparts a smooth surface.

4. Reelers on which the paper is slit to the size required. 5. "Wet-end" of a paper machine on which the paper is formed. 6. "Dry-end" of a paper machine where paper is reeled for the super-calenders

PAPER: STAGES IN THE PROCESS OF NEWSPRINT MANUFACTURE

By courtesy of the Imperial Paper Mills, Ltd., Gravesend

pulp circulates round the trough, past a central partition (the mid-feather), and then under the roll, the clearance between the beater bars and the bedplate being very small but adjustable to give the required degree of beating to the fibres. This treatment, which may take from one to 16 hrs., develops the strength of the pulp and alters its drainage characteristics; it needs to be carefully controlled to suit the specific type of paper being made.

After screening, the diluted paper pulp is run into a vat into which the vatman dips a shallow wire gauze sieve, called a hand mould. He withdraws a definite amount of stuff and shakes the mould in such a way as to cause the individual fibres to interlock as the water drains away. The mould is handed to the coucher who inverts it and deposits the sheet skilfully on to a wet woollen felt. The eventual pile of paper and felt is then pressed in a hydraulic press for 12-24 hrs. at $1\frac{1}{2}$ tons per sq. in. to remove excess moisture. The sheets are then hung over cow-hair ropes (to prevent staining) to become air-dry, dipped into gelatine size solution, and again air dried. The final operation is plate-glazing, the sheets being placed singly between polished copper or zinc plates and passed to and fro between heavy calender rolls.

Handmade papers are nowadays usually reserved for special library editions of books, for high grade stationery, and as artists' material.

For mass production paper machines cheaper materials than rags, e.g. wood, straw, esparto, are used. They are much less pure forms of cellulose than rag and all need special chemical treatment to eliminate lignin (*q.v.*), etc. Most chemical wood pulp is prepared by the sulphite process, in which small chips of wood are cooked under pressure with calcium bisulphite solution containing some free sulphur dioxide in solution. The product is very useful for most types of paper, including printing and writing grades. The "Kraft" process, based on digestion with caustic soda and sodium sulphide, yields a strong brownish pulp suitable for wrapping and paper sacks; after bleaching, it can also be used for most purposes for which bleached sulphite pulp is used, but with the advantage of greater fibre length. The soda process involves cooking with caustic soda and yields soft, easily bleached pulps.

Wood can, however, be used without chemical treatment. Barked logs are pressed against revolving grindstones under a flow of water which serves to cool the stone and carry the groundwood away to the screening machines. It then emerges as a fine, uniform pulp of good colour and brightness, suitable for newsprint manufacture. About 15 p.c. of the comparatively long-fibred sulphite pulp is added to improve the strength of the resulting sheet. Enormous newsprint machines, up to 300 ins. in width, and working at speeds up to 1,500 ft. per min., produce a paper able to stand the strain of printing by high-speed rotary newspaper presses. Wood pulp is generally made where wood and water power are readily available, as in Scandinavia and N. America, and is frequently converted immediately into paper, being pumped directly to the paper machines in the form of an aqueous suspension or "slush." Alternatively both chemical and groundwood pulp are made into sheets and baled for shipment to paper mills. Groundwood is usually shipped 40-50 p.c. wet, whilst chemical pulp is normally exported air-dry.

Process of Manufacture

On arrival at the newsprint mill, the pulp needs only the barest minimum of beating, mixed with water at a concentration of six p.c. After the addition of china clay slurry and a trace of dye, the stock passes through the refiners which break down oversize bundles of fibre and generally help to prepare a uniform suspension having the required drainage properties. The refined stock is diluted to 0.5-1.0 p.c. concentration and pumped to the strainers. From there it flows into a breast box where the necessary head and special streamlined construction make the stock pass smoothly under a slice on to the wire of the Fourdrinier paper machine. The wire is an endless wire gauze with about 55 meshes to the inch, drawn level between the breast roll at one end and the couch roll at the other. At intermediate positions it is supported by table rolls and suction boxes. As the thin mixture of pulp and water travels along with the wire, the fibres part with their water by drainage and by extraction at the suction boxes. After the wire, carrying the stock with it, has passed over the suction couch roll, the moisture content of the very wet immature sheet has dropped to 80 p.c. From

the couch, the paper is drawn forward, unsupported for the first time, to the woollen "wet felts" which convey the web through presses. The press rolls, of which there may be two or three pairs, smooth the web and reduce the moisture content to about 65 p.c. The web then passes to steam-heated drying cylinders, against which it is pressed by cotton "dry felts"; it arrives at the other end containing about eight p.c. moisture. Still in continuous production, the paper passes direct from the dryers to the machine calender, where a certain amount of gloss is given to it. After this the paper is put on reels, and the reels are afterwards transferred to a super-calender. This is a stack of alternate paper and steel rolls, which by friction and pressure produce a high gloss on the web. Finally, the wide reels are slit on the reeler by rotary knives to provide sizes suitable for newspaper printing; the correctly cut reels are then packed carefully for transport to the press rooms.

The pulp for paper other than newsprint requires beating to some degree, and when necessary rosin soap and alum are added to the stock as sizing agents, together with loading materials, dyes, and pigments. The machines are slower than newsprint machines and range from about 80 to 150 ins. in width. The wire part is shaken by mechanical means to assist the felting of the fibres. The watermark is applied by means of a dandy roll, a rotating wire gauze cylinder with a wire design raised on it, placed just before the point at which the full vacuum of the suction boxes comes into play. The web becomes thinner where the design presses on it and the paper is consequently more transparent in that place.

Millions of shell containers were manufactured during the Second Great War from low grade waste paper mixed with a certain proportion of "Kraft" pulp, and vital supplies reached Allied troops in torrid, frigid, arid, and humid theatres of war in good condition, thanks to the efficient waterproof and weatherproof paperboard packages. Aeroplane and machine parts were fabricated from paper-base plastics, and containers for oil, petrol, and blood plasma were made from paper. One of the most notable was the jettison fuel tank, a 100-gall. torpedo-shaped vessel made from "Kraft" paper, which extended the range of fighter aeroplanes.

Commercial paper products include packages for milk, cereals, and dehydrated foods, and sacks for cement and chemicals; laminated "Kraft" and other products used in building; twisted, braided and woven papers for textiles and the cable industry. Paper is also used for surgical dressings, curtains, and draperies, and to some extent for clothing.

Consumption of paper and paper-board in the U.S.A. has risen from 58 lb. per capita in 1899 to 121 lb. in 1918 and nearly 350 lb. in 1947. Restriction in the U.K. during and after the Second Great War kept consumption there at an artificially low level. World paper production for 1947-48 was estimated at over 25 million tons, about seven million of it newsprint.

Bibliography. Text Book of Paper Making, C. F. Cross and E. J. Bevan, 5th ed., 1920; Chemistry of Pulp and Paper Making, E. Sutermeister, 3rd ed., 1941; Modern Pulp and Paper Making, G. S. Witham, 2nd ed., 1942; A Laboratory Handbook of Pulp and Paper Manufacture, J. Grant, 1942; Modern Paper Making, R. H. Clapperton and W. Henderson, 2nd ed., 1947; Paper Making, Dard Hunter, 1947.

S. V. Sergeant, A.R.I.C.

Paper, SIZES OF. Term for the dimensions of printing, writing, drawing, and brown papers. Of British printing paper there are 14 sizes, ranging from foolscap, 17 ins. by 13½ ins., to double post, 32 ins. by 40 ins.; of writing and drawing papers, 17 sizes, varying from post, 15 ins. by 12½ ins., to emperor, 72 ins. by 48 ins.; and of brown papers, eight sizes, from Kent cap, 21 ins. by 18 ins., to casing, 46 ins. by 36 ins.

Paper Control. This feature of administration in the Second Great War is mentioned under Newsprint.

Paperhanging. For details of this work, see under Painting and Decorating.

Paper Money. Slips of paper which are legal tender. Cheques, bills of exchange, etc., though forms of money, are not legal tender. In most modern states paper money forms the major constituent of the currency, metallic money—coins—being used only for units of small denomination. In the U.S.A., Canada, and many European countries notes are used for sums even lower than the largest British coin (the five-shilling piece).

In Scotland and N. Ireland the notes of trading banks con-

stitute an important part of the paper money, while in the U.S.A. notes are issued by commercial banks and the Federal Reserve banking system as well as by the Treasury. In Canada, Australia, and New Zealand commercial bank notes were formerly common. Usually, however, notes are issued by the state, or, more usually, by the central bank on behalf of the state. English bank notes are issued by the Bank of England, a state-owned institution since 1946. The former treasury notes were taken over by the Bank of

NOMINAL VALUE OF SELECTED NOTE ISSUES

	1939	1946
Bank of England	£563 m.	£1,400,248 m.
Bank of Australia	£A48 m.	£A198 m.
Bank of New Zealand	£NZ16 m.	£NZ46 m.
Bank of France	Fcs. 130,000 m.	Fcs. 680,517 m.
U.S. Federal Reserve Banks	\$4,609 m.	\$24,552 m.
Swiss National Bank	Fcs. 1,724 m.	Fcs. 3,722 m.
Reserve Bank of India	Rs. 1,700 m.	Rs. 12,000 m.
Netherlands Bank	Fls. 1,133 m.	Fls. 2,810 m.
Bank of Belgium	Fcs. 23,910 m.	Fcs. 71,440 m.

England, although then a private institution, in 1928.

The use of paper for money was common in China more than 1,000 years ago. In the U.K. it arose early in the 17th century and then consisted of the notes—or receipts—given by the goldsmiths for coin deposited with them for greater safety, these receipts eventually passing from hand to hand as money. The first Bank of England notes, for £20, came into circulation in 1695; by 1844 notes issued by 279 other banks were in circulation. The Bank Charter Act of that year so restricted the right of note issue that by 1921 that of the last remaining issuing bank, apart from the Bank of England, lapsed on the bank's amalgamation with Lloyds Bank Ltd. From 1829 until the issue of treasury notes (called "Bradburys" from the fact that they bore the signature of Sir John Bradbury, then secretary to the Treasury) in 1914, notes of less than £5 were prohibited. They were then issued for 10s., £1, £5, £10, £20, £50, £100, £200, £500, and £1000; notes of denominations larger than £5 were withdrawn and ceased to be legal tender on April 30, 1945, as a precaution against tax evasion.

Notes have almost entirely superseded gold coins internally. Externally, however, they have the disadvantage that, unlike gold, they have no guaranteed value abroad. Over-issue of notes was

once thought to constitute a major cause of inflation, and as a safeguard only notes which were fully convertible into gold on demand were considered safe; but experience has proved that inflation arises from a variety of causes of which the over-issue of paper currency is only one. The linking of the note issue to gold has been shewn to be harmful owing to the extent to which it makes the internal economy of a country subject to external conditions (gold having to be imported by most countries). The last attempt made

by the U.K. to do so, in 1925, was abandoned in 1931.

The extent to which notes are used as money appears from the table showing the nominal value of the note issue in certain countries in 1939 and 1946.

See Bank Note; Currency; Legal Tender; Money.

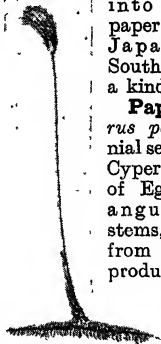
Paper Mulberry (*Broussonetia papyrifera*). A small tree of the family Moraceae. A native of China, it has hairy egg-shaped leaves. The greenish flowers have the sexes distinct on separate trees, the males in catkin-like clusters, the females in a round



Paper Mulberry. Leaves and flower clusters

head. The latter are succeeded by scarlet fruits much like a mulberry in shape, but without flavour. The inner bark is beaten into pulp to make paper in China and Japan, and in the South Sea Islands into a kind of cloth.

Paper Reed (*Cyperus papyrus*). Perennial sedge of the family Cyperaceae. A native of Egypt, it has triangular flowering stems, 3-12 ft. high, from whose summit is produced the spike of flowers ringed by whorls of bracts. See Egypt; Paper; Papyrus.



Paper Reed. Stem with flowering spike

Paphlagonia. Ancient country of Asia Minor. On the Black Sea, it lay between Pontus on the E. and Bithynia on the W. It was a mountainous area, and its capital was Gangra. After having been part of the kingdom of Croesus, it passed under the rule of the Persian kings, but it evidently enjoyed a considerable measure of independence, while Greeks made settlements on the coast. The eastern portion next became part of the domains of the king of Pontus, and remained so until the power of Mithradates was destroyed by the Romans, who included it in Bithynia.

Paphos. Two ancient towns on the W. coast of the island of Cyprus. Old Paphos (mod. Kuklia), about a mile from the sea, and originally a Phoenician colony, was famous for its worship of Aphrodite, who was said to have landed here after her birth from the sea foam. Remains of the wall of the temple erected in her honour still exist. New Paphos (mod. Baffo), about 7 m. W. and more inland, became one of the seats of administration of the island in Roman times. See Cyprus.

Papias (c. 60-135). Apostolic father. He was of Phrygian birth, and is said to have become bishop of Hierapolis. The statements that he was associated with S. John and S. Polycarp, and that he was martyred, have been disproved. He is important as the author of an Exposition of the Oracles of the Lord, of which only fragments are extant.

Papier Mâché (Fr., pulped paper). Paper pulp compressed and moulded, and used in the manufacture of various articles. Usually some earthy material is added, with glue or resinous matter to help to bind it. This composition is then rolled into thick sheets, which are moulded and pressed to the requisite shape and dried, after which the article can be decorated with enamel, paint, or inlaying. Trays, boxes, masks, and even light furniture are made of papier mâché.

Papilloma. Tumour more or less elongated in shape. Warts (*q.v.*) and polympi are common forms.

Papin, DENIS (1647-1712). French physicist. Born Aug. 22, 1647, at Blois, he became assistant to Huygens in Paris in his experiments with the air pump. Papin visited England, became a member of the Royal Society, and in 1690 constructed the first steam engine with a piston, applying his invention to a paddle-wheel boat. He invented the safety valve, and

showed that the boiling points of liquids depended upon the pressures to which they were subjected. He died in London. Consult Growth of the Steam Engine, R. H. Thurston, 5th ed. 1895.

Papineau, LOUIS JOSEPH (1786-1871). Canadian politician. Born at Montreal, Oct. 7, 1786, and educated at Quebec, he was made Speaker in 1815, and in 1820

a member of the executive council, on which he sat for three years. A leader of the French Canadians, he was prominent in desiring drastic changes in the methods of government, and in opposing the suggested union of the two Canadas. Embittered by failure to carry his reforms, he led a rebellion in 1837. This failed and Papineau fled to the



Louis Papineau, Canadian politician
U.S.A., being declared a rebel. In 1847 a general amnesty was proclaimed and he returned to Canada. Elected to the legislature until 1864 he continued to work for Canadian independence. He died Sept. 24, 1871.

Pappenheim, GOTTFRIED HEINRICH, COUNT VON (1594-1632). Bavarian soldier. He was born at Pappenheim, May 29, 1594. He fought under Sigismund against the Poles, and joined the Catholic League, 1620. He was one of the chief imperial leaders of the Thirty Years' War (*q.v.*). After Tilly's death he served with Wallenstein, and at the battle of Lützen in the midst of a furious attack he fell wounded, dying the next day at Leipzig, Nov. 17, 1632.

Paps of Jura. Mountain peaks of the island of Jura, Argyleshire, Scotland. They form the S. extremity of a bleak and rugged range, and consist of three conical summits rising above a deer forest. Beinn-an-Oir (mountain of gold) reaches 2,571 ft.; Beinn Siantaidh (hallowed mountain), 2,477 ft.; and Beinn-a-Chaolais (mountain of the firth), 2,407 ft.

Papua. Name formerly given to the Pacific island of New Guinea, but now applied only to British New Guinea, the S.E. section. Its geography and history are dealt with under New Guinea.



Papua. Native couple, the woman in mourning weeds

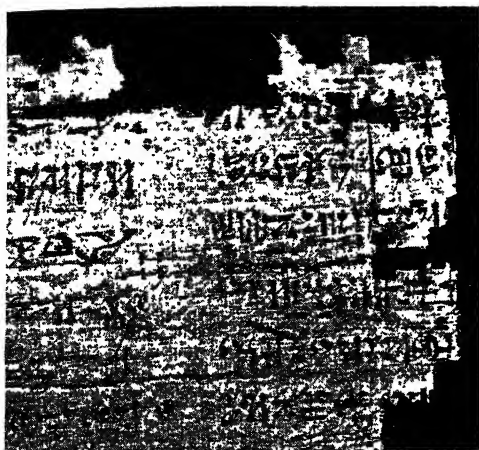
Papua, GULF OF. Large bay on the S. coast of the island of New Guinea, N.E. of Cape York Peninsula, Queensland. It receives the waters of the Fly and other rivers of Papua.

Papuan (Malay, mop-headed). Term denoting aboriginal peoples of negroid stock, mostly in Dutch New Guinea. They are a tall, brownish-black, long-headed race, with receding forehead, prominent brow-ridges, nose sometimes aquiline, and frizzy hair—often dressed mopwise. Their culture is characterised by bone-tipped arrows and stone clubs.

Papworth Village Settlement. Community near Cambridge, England, for the employment of consumptives. Founded in 1917 by Dr. (later Sir) Pendrill Varrier-Jones, it grew from one cottage garden to a village of 1,500, grouped about a hospital and a sanatorium, where patients are helped to recovery and ex-patients settle with their families. Most inhabitants of the settlement would normally be unemployable, and the cost of their wages is largely met by the sale of their productions and supplemented by public contributions. The direction of Papworth is closely associated with that of Enham (*q.v.*).

Papyrus. Ancient documents written upon papyrus, this being the Greek form of the Egyptian name. The papyrus rush, *Cyperus papyrus*, formerly harvested in the Egyptian delta for numerous purposes, has receded to the upper Nile. Moistened strips of stem laid side by side formed the longitudinal warp; shorter strips overlaid crosswise, after the whole was pressed, dried, and polished, formed the writing surface. Ink, of sepia, animal charcoal, and other substances, was applied with a reed. These materials endured in literary use from the pyramid age, if not before, to the 4th century of our era, surviving casually to 1250.

Invented for Egyptian writing, they were adopted for Aramaic (as at Elephantine), Greek, Latin, and Arabic, constituting an important export trade at Alexandria in Greco-Roman times. The oldest example, now at Cairo, contains records of the Vth dynasty king Assa, during whose reign his tutor, Ptahhotep, compiled the famous maxims preserved in a XIIth



Papyrus. Reproduction of part of a papyrus inscribed in the Hieratic character, containing an Egyptian romance and bearing the names of Antef, 2500 B.C., and Thothmes III, 1600 B.C.

British Museum

dynasty copy, the Prisse at Paris, sometimes called the oldest book in the world. The longest roll is the Harris No. 1, 135 ft. long, a panegyric of Rameses III (c. 1170 B.C.), in the British Museum. The finest rolls are the illustrated copies of the Book of the Dead. The Alexandrian library, destroyed by fire, 47 B.C., contained 700,000 works. The masses of papyri found in Egypt have yielded valuable literary remains. See Ani; Book of the Dead; Codex.

Par (Lat., equal). Financial term for the price of a stock or share when such sells for exactly its face value. Thus if Consols stood at £100 it would be said that the price was at par. Above or below par means that the selling price is higher or lower than the face value.

Pará. River of Brazil. Strictly the S. tributary of the Amazon delta, it receives the Tocantins and has the island of Marajo between it and the N. Channel. It is 200 m. long with a width from 12 to 40 m., and has a bore during the spring tides 15 ft. in height.

Pará. State of Brazil. It is situated in the N.E., adjacent to the three Guianas, to the E. of Amazonas, with a long coast-line on the Atlantic Ocean. The lower Amazon almost bisects the state, which contains the lower courses of the Tapajoz, Xingu, and Tocantins tributaries, and includes the island of Marajo in the Amazon delta. The only rly. is from Belem to Bragança. Most of the state is covered with dense forest. Rubber, cacao, timber, and Brazil nuts are obtained, and it gives its name

to a form of rubber. Pará is the capital. Its area is 443,789 sq. m. Pop. 1,039,661. See Rubber.

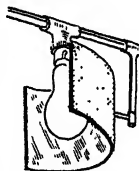
Pará or BELEM DO PARÁ. Details of this Brazilian port will be found under Belem.

Parable (Gr. *parabolē*, juxtaposition, comparison). Illustration of a statement in a discourse. The term is now mainly confined to those teachings of Christ which convey a spiritual lesson in the form of an anecdote or short story. Popularly described as an

earthly story with a heavenly meaning, a parable differs from a fable or an allegory in being either a true record of fact, or at least true to experience, while a fable always, and an allegory usually, is purely fictitious and often impossible. In the Bible the word parable is used somewhat vaguely, but its meanings may be classed under three headings—enigmatical assertions, ornate discourses, and illustrative stories. The last method of teaching was common among the Jews, and several of Christ's parables occur also in the writings of the great Rabbis. See Bible; Christianity.

Parabola. In geometry, one of the sections of a cone. It is the section produced by a cut parallel to the slanting edge of the cone. In analytical geometry it is defined as the locus of a point the distance of which from a fixed point, called the focus, is always equal to its distance from a fixed straight line, the directrix. The curve is an important one in dynamics as the path of a body projected at an angle to the horizon, and in optics, since a light placed at the focus of a parabolic mirror has its rays reflected in parallel lines, a fact made use of in the construction of lighthouse lanterns. See Conic Sections.

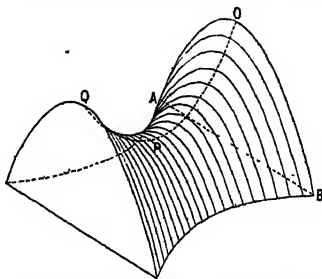
Parabolic Reflector. Instrument to reflect light from a concentrated source and so form a beam of small divergence. The reflector consists of a concave mirror



Parabolic Reflector

(sometimes of metal), placed behind the light source. The point source of light is placed at the focus of the mirror, when, the angle of reflection equalling the angle of incidence at all points, the light is reflected as a parallel beam. Parabolic reflectors are sometimes incorporated in motor car headlamps, but their principal use is for searchlights, lighthouses, and similar projectors.

Paraboloid. In solid geometry, a solid whose surface is generated by a parabola which moves with



Paraboloid. Diagram illustrating a paraboloid surface. OPQ is a parabola along which the vertex O of parabola AOB moves

its vertex always on another parabola. The axes of the two parabolas are parallel and their planes at right angles. A paraboloid of revolution is generated by the revolution of a parabola about its own axis.

Paracelsus or THEOPHRASTUS BOMBAST VON HOHENHEIM (c.1492–1541). Swiss philosopher, born at Einsiedeln, the son of a physician. His education was irregular, but he acquired a knowledge of medicine, chemistry, etc.

He travelled much, studied nature, and despised bookmen. Although he had no degree, he practised, and was even appointed professor of physic and surgery at Basel, lecturing in German. Of undoubted ability, though of erratic life, Paracelsus, by his successful if empirical application of mineral medicines, gave a great impetus to pharmaceutical chemistry. Accused of being a necromancer, he fled from Basel, and, after an adventurous life, died at Salzburg, Sept. 24, 1541.

Paracelsus is the hero of a work by R. Browning, published 1836, in which he is represented as a philosophical genius with lofty



Paracelsus, Swiss physician

aims, whose pride and ambition destroy his sympathy and his moral character. *Consull* Lives, F. Hartmann, 1887; A. M. Stoddart, 1911.

Parachute (Fr., from Ital. *parare*, ward off; Fr. *chute*, fall). Device to retard the descent of a falling body. Leonardo da Vinci (1452-1519) left notes and sketches explaining the theory of the parachute, but did not construct one. The first man to design and use a parachute was André Garnerin, who jumped from a balloon over Paris on Oct. 22, 1797. The Garnerin parachute consisted of a piece of cloth stretched over a rigid framework

observers in kite balloons. They were attached by a cord to the balloon basket and opened by the weight of the wearer as he jumped. The manually-operated parachute, fixed to the wearer, was introduced towards the close of the First Great War for use by aircraft crews, though it was not officially adopted by the R.A.F. until some years later.

The standard parachute used by the R.A.F. during the Second Great War consisted of a canopy of pure silk or high quality nylon 24 ft. in diam. with a surface area of 62 sq. yds. The canopy was made of a number of small panels,

When he jumped, the parachutist counted three, to give him sufficient time to clear the aircraft, and then pulled the release ring, so withdrawing the release pins from the slots on the pack. The flaps of the pack then opened, and the small pilot-parachute held by compressed springs, was freed to drag after it the main canopy which opened fully in $1\frac{1}{2}$ secs. The vertical movement under the effect of gravity induced an upward air pressure which inflated the canopy and so retarded descent. The average rate of descent was about 20 ft. per sec., and by pulling on the cords the parachutist could exercise some control over the direction of his descent. Parachutes used by parachute troops were of the static line type, the rip cord being attached to the aircraft and automatically released as the wearer jumped. Parachutes used for dropping supplies were made of cotton and were smaller than those used to support men.

With the development of the high-speed jet-propelled fighter, it was found that a pilot obliged to use his parachute had difficulty in clearing the aircraft before his parachute opened, with the consequent risk of the canopy becoming entangled in the machine. This was overcome by the invention of the ejector parachute. In this, the pilot's seat was incorporated with the parachute and connected to an explosive charge. By pressing a button, the pilot shot himself clear of the aircraft to a safe distance, when he pulled the rip cord in the normal way.

In the Second Great War 10,000 parachutes a month were made for the British forces.

Parachute and Cable Unit.

British anti-aircraft weapon of the Second Great War. It consisted of a number of cables, each 400 ft. long and having a rocket and folded parachute attached to its free end, coiled in a box. The rockets were electrically connected with a master switch in an observation post close to the target. The closing of the switch ignited the rockets, which carried the cables to their maximum height, when the parachutes automatically opened, so preventing the cables from falling back to earth. Cables could be fired simultaneously in any number up to 50. The weapon was particularly effective against dive-bombers, the cables either becoming entangled in the aircraft or forcing it to take evasive action. It



Parachute. Left, airman with packed parachute fastened to his back before entering an aeroplane. Right, a descent

of wooden laths. Later, silk parachutes were stretched over balloons and kept open ready for emergency descents.

In 1838 John Hampden designed an umbrella type of parachute consisting of a piece of canvas 15 ft. in diameter stretched over whalebone ribs. He jumped from a height of 9,000 ft., taking 13 mins. to descend. Towards the close of the 19th century parachute descents were a popular exhibition at the Alexandra and Crystal Palaces, London. Free, or unpacked, parachutes were used, the jumper and his equipment being taken up in a balloon. The chief defect of early parachutes was the excessive oscillation to which they were subject during descent; in 1885 this was overcome by a U.S. parachutist, Thomas Baldwin, who fitted a hole or vent in the top of the fabric.

During the First Great War, parachutes were provided for

so that in the event of a rip the tear would not extend beyond one section of the material. Evenly spaced around its circumference were 36 shrouds, or lines of silk cord. These met at a point some distance below the fabric, and were attached to the wearer's harness by a ring. On top of the canopy was a small pilot-parachute 3 ft. in diam. Parachutes and shrouds were folded into a pack 18 ins. square, the whole weighing 18 lb. The pack was attached by long straps to a web harness passing over the shoulders and between the thighs of the wearer, who could carry the pack on his back or lap or use it as a seat. The folded canopy was held in the pack by two pins running through slots in the outer cover, and attached to each pin was a flexible steel cable, called the rip cord, which was connected to a release ring on the left-hand side of the wearer's belt.

could not, however, be sighted on a target, so that it could be used only when an aircraft came within its range and direction. Operation of the parachute and cable unit was the responsibility of the R.A.F., which used large numbers to protect dispersal points on airfields. It was also used to a limited extent in the defensive arming of merchant ships.

Parachute Bomb. Aerial bomb to which a parachute is attached. It was developed in the Second Great War by the R.A.F. so that low-flying bombing could be carried out with accuracy. Parachute bombs ranged in size from a small fragmentation bomb to those weighing 1,000 lb. The parachute was held in a container attached to the end of the bomb, and the canopy opened automatically as the bomb was released from the aircraft. The bomb was fired by time or contact fuse. Large parachute fragmentation bombs were particularly effective in attacks on aircraft dispersed on aerodromes, the casing breaking into 1,500 pieces on impact and striking the target with a velocity of 4,000 ft. per sec. There was little defence against the parachute bomb, as destroying the parachute by gunfire merely brought the bomb down faster, when it exploded on contact.

Parachute Regiment. Regiment of the British army. It was formed in 1942 to provide personnel for the Parachute bdes. and Independent (Pathfinder) companies within the airborne divs. With the Glider Pilot regt. (*q.v.*) it constitutes the Army Air Corps (*q.v.*). All personnel of the Parachute regt. are volunteers, and recruits are given special physical hardening training to fit them for the four weeks' parachute course at the parachute instruction school. Primary training at the school consists of exercise on various types of ground apparatus designed to teach the correct principles of breaking falls, etc. Recruits then make two jumps at 800 ft. from a captive balloon by day, after which they make five jumps by day from an aircraft and one by night from a captive balloon. On successful completion of the course, recruits are awarded their parachute wings, worn on the right sleeve, and are entitled to parachute pay.

The parachute is merely the means of getting members of the Parachute regt. into battle; when they have landed they fight as infantry.

When making their drop, parachute troops are as lightly equipped as possible. Their non-offensive equipment comprises two days' food and water, a crash helmet, and thick-soled boots. Weapons carried are revolvers, sub-machine-guns, light automatic rifles, and hand grenades. Heavier equipment, such as machine guns, demolition material, radio transmitters and receivers, motor cycles, and tools, are dropped in containers by separate parachutes.

In the Second Great War, the Parachute regt. served in N. Africa, Italy, and W. Europe. There are a number of Territorial army battalions affiliated to the Parachute Regt. See Parachute Troops.

Parachute Troops. Soldiers carried in aircraft and dropped by parachute on to their objective.

The U.S.S.R. was the first country to train military parachutists in any numbers. By 1935 the Red army had at least one fully-equipped and trained parachute battalion. At the army manoeuvres held in Russia in 1937, and observed by British and German military missions, a mechanised brigade, complete with light artillery and tanks, was carried a distance of 200 m. in converted bombers and dropped at night by parachute without accident. By 1939, the Red army was estimated to have at its disposal some half million men trained in the use of parachutes. Nazi Germany, appreciating the potentialities of parachute attack, in the years immediately preceding the Second Great War trained thousands of troops in the use of parachutes. France in the autumn of 1938 also carried out a convincing demonstration by dropping a fully-equipped machine-gun co. of 60 men from six troop-carriers. Within five minutes of landing the co. was free of its parachutes and had set up its machine guns. British military opinion dismissed parachute attack as of little practical value, holding that any troops successfully dropped would be wiped out before they could go into action.

Parachute troops went into action for the first time on Nov. 30, 1939, when Russia invaded Finland and dropped a number of parachutists near Petsamo. Germany used parachute troops successfully in her attacks on Norway, the Netherlands, Belgium, and France in 1940; she assembled a large parachute force for the invasion of Great Britain, but in

April, 1941, diverted it to the attack on Greece and Crete. German parachute troops were employed on a comparatively small scale in the campaigns against the U.S.S.R.; principally because of the great distances and the mobility of the Soviet armies. One of their most notable uses in Russia was as a defensive measure in Nov., 1942, when the Soviet army was advancing on Kharkov. Von Bock then dropped a large force on the Russian communications, disorganizing the Soviet advance and enabling the Germans to regroup their troops.

British parachute troops first went into action in Feb., 1941, when a small force was dropped in S. Italy in an unsuccessful attempt to destroy a viaduct. Better success attended the newly-formed Parachute regt. (*q.v.*) in the raid on Bruneval (*q.v.*), Feb., 1942, and those of the unit taking part in the combined operations attack on St. Nazaire (*q.v.*) the following Nov. British parachute troops occupied enemy airfields in the N. African landings, Nov., 1942, took part in the invasion of Sicily in July, 1943, and in the struggle for the Anzio beach-head, Jan., 1944. British and U.S. parachutists formed the spearhead of the Allied invasion of Normandy, June 6, 1944; more parachute troops were used in that operation than the Germans had had available for the invasions of Norway, the Netherlands, and Crete. A large force of British parachute troops was landed at Arnhem (*q.v.*) on Sept. 17, 1944, U.S. troops landing at Eindhoven and Nijmegen on the same day.

Besides the part they played in N. Africa and Europe, U.S. parachute troops also fought in the Pacific war, *e.g.* in operations in the Markham valley in New Guinea Sept., 1943. The Japanese used parachute troops in their attacks on Malaya, the Netherlands East Indies, Borneo, and the Philippines, 1941-42.

The training of parachute troops is described under Parachute Regiment. See also Airborne Forces.

Paraclete (Gr. *paracletus*).

Word used in S. John's Gospel as a name of the Holy Ghost or Holy Spirit (chaps. 14. *vv.* 16 and 26; 15. *v.* 26; 16. *v.* 7). It is also used, in the 1st Epistle of S. John (2. *v.* 1), of Christ. From Chrysostom's time, the word has been translated Comforter, a custom based on Isaiah 40. *v.* 1, and on the fact that *paracletis* sometimes means consolation, but modern commentators

prefer the translation of "one called in" or "called to the side of another," for the Gospel reference, and that of Advocate in the Epistle. Paraclete is a title of the Holy Ghost in the Roman Breviary. See Abelard; Holy Spirit.

Paradise. Word used as a synonym for the garden of Eden; for a region of surpassing loveliness; as a place to which the souls of the righteous are transplanted after death; and sometimes for heaven. The Heb. *pardes*, and Gr. *paradeisos*, were borrowed from old Persian *pairi-daeza*, a park, especially a deer park or garden of the Persian kings. Applied in the LXX, Syriac and Vulgate versions, though not in the Hebrew original, except in Ezek. 28, v. 31, to the garden of Eden, the word came to be used by the apocalyptic writers to the heavenly counterpart of the earthly garden.

The phrase Paradise of Fools is applied to a place midway between Paradise and Purgatory, in which those who have sinned without intention await the Judgement Day. The medieval conception of Paradise is elaborated in the third part of Dante's Divine Comedy.

The Muslim paradise is usually spoken of as a place of unsatiating sensual pleasure; modern commentators on the Koran insist that Paradise is not only a place in which to enjoy the blessings and rewards of good deeds on earth, but a starting-point of unending spiritual advancement. See Angelico, illus. p. 437; Eden; Heaven; Hell; Purgatory.

Paradise Fish. Name given to an artificially modified fish belonging to the genus *Macropodus*. It is nearly allied to the climbing perch, and has been developed in China by a long process of selective breeding. It is striped with red, gold, and green, and has long wavy fins and tail; it is hardy, and breeds readily in small aquariums.

Paradise Lost. Epic poem by Milton, published in 1667. It begins with the fall of Satan and his rebellious host of angels from heaven and then proceeds to man's fall, consequent upon the warning of the powers of darkness against the beings whom God had put in Paradise in the newly created world, and so to the expulsion of Adam and Eve from the Garden of Eden. The work is acknowledged as the great representative of the epic in English literature, written in finely cadenced and dignified blank verse, to which the poet imparted something of a new music,

and as the greatest of all poems in its use of supernatural machinery. See Milton, John.

Paradise Regained. Epic poem by Milton, published in 1671. Stimulated by Thomas Ellwood, a Quaker friend, who remarked: Thou hast said much here of Paradise Lost, but what hast thou to say of Paradise Found? Milton set about this sequel in four books. The subject is the temptation of Christ, by whose victory over Satan the effect of the temptation of Adam was reversed. The poem differs from Paradise Lost in the much greater simplicity of the story, which is mainly an expansion of the Gospel narrative, and in the singular austerity of the style. It has never been popular, although some critics have expressed the highest admiration for it. See Milton, John.

Paradiso, GRAN. Mountain of Italy, in Aosta prov., Piedmont. The culminating peak of the Graian Alps, and the highest mountain in Italy, alt. 13,324 ft., it overlooks the Piedmont plain and is S. of the Dora Baltea. The ascent is usually made from Valsavaranche, skirting the Gran Paradiso glacier; the descent frequently across the Glacier de la Tribulation to Cogne. It was first climbed by Cowell and Dundas in 1860. See Alps; Mountaineering.

Parados (Fr. from Ital. *parare*, to shelter, and Fr. *dos*, back). Military term for the cover at the back of a trench. In fortifications and trenches it is necessary to provide cover from reverse fire, i.e. fire directed at the occupants from



Paradise Fish. The artificially modified fish bred in China

the rear of the position, or badly aimed shots from another position, and from flying fragments of shell exploding behind the position. The cover provided, whether it be earth, sandbags, or masonry, is termed the parados of the position.

Paradox (Gr. *para*, contrary to; *doxa*, opinion). Statement contrary to accepted opinion, apparently self-contradictory, or reversing that which is commonly understood. A legitimate figure, serving to illus-

trate an argument either by exaggeration, or by revealing a side of it in a new light, it is one that becomes dangerously facile, and degenerates into little more than playing with ideas as a punster plays with words. Modern writers who have made something like a cult of the paradox are Wilde and Chesterton, the latter having defended the use of Latin in church services, because "a language must die to be immortal."

Paraffin. In organic chemistry, term applied to a homologous series with the general formula C_nH_{2n+2} . The normal members have the carbon atoms linked in a straight chain, and isomerism (*q.v.*) can arise by branching. The simplest member is methane (marsh gas), CH_4 . The next three members, ethane, propane, and the butanes, and an isomer of pentane, tetramethylmethane, are also gases at normal temperature and pressure. From pentane to pentadecane, $C_{15}H_{32}$, they are liquid, and from hexadecane, $C_{16}H_{34}$, onwards they are crystalline solids. The paraffins are stable saturated compounds, but it is possible to substitute various elements such as the halogens for one or more of the hydrogen atoms. Gaseous, liquid, and solid paraffins occur naturally in petroleum, shale oils and some tars derived from coal and lignite.

In the petroleum industry the term paraffin usually refers to the wax (paraffin wax) removed from certain crude oils. The principal source is the lubricating oil distillate from paraffinous crudes. When cooled the wax crystallises, causing a great increase in viscosity. Removal of the wax is therefore necessary to improve the quality of the lubricant. The oil is chilled and filter-pressed, crude wax being left. It still contains oil which is removed by sweating, and in the same process the wax itself is divided into a number of grades. For final purification molten wax is filtered through fuller's earth. Paraffin wax has many applications: candles and nightlights; waterproofing paper, cartons, cloth, concrete, wood; coating certain foodstuffs; electrical insulators and dielectrics; polishes.

The soft paraffin of the British pharmacopoeia is a petroleum jelly (petrolatum) which has been refined. Petroleum jelly is a residual product from the refining of certain crude oils and is composed of microcrystalline waxes intimately associated with oil. In the U.K. paraffin or paraffin oil are names popularly given to kerosene (*q.v.*).

Paragua. Island of the Philippines, also called Palawan (*q.v.*).

Paraguay. River of S. America, principal affluent of the Paraná. It rises in the Sierra Diamante in the Matto Grosso plateau of Brazil, and flows S. across the state of Paraguay to join the Paraná above Corrientes in Argentina. Above Asunción it receives the São Lourenço, Taquary, and other tributaries from the E. At Asunción the Pilcomayo, and lower

down the Bermejo, drain from the Andes across El Gran Chaco. The Pilcomayo and lower Paraguay form the W. boundary of the state of Paraguay. Steamboats from Buenos Aires reach Asunción. For smaller boats the Pilcomayo is navigable for 150 m. and the main stream for nearly the whole course. Its length is 1,500 m. The confluence with the Paraná was discovered by Sebastian Cabot in 1526. *See* Asunción.

He holds office for five years, and appoints his cabinet of nine, which need do no more than inform the diet (consisting of one elected member for every 25,000 inhabitants) and council of state (nominated) of its policy. The country is divided into two parts—Oriental and Occidental—the Paraguay river dividing the two.

There is a small standing army of about 6,000. In the event of war, service is compulsory in the army, the national guard, or the territorial guard. The R.C. church is established, and all religions are tolerated. Primary education is free and nominally compulsory. There is provision for higher education. The guarani (equivalent to 32-3625 U.S. cents) replaced the former unit of currency, the peso, in Oct., 1943.

River Communication

The main channel of communication is the Río de la Plata. Large river steamers and small sea-going ships penetrate as far as Asunción. Thence N. the Paraguay is navigable by smaller steamers throughout the limits of the republic. The broken and rapid stream of the Upper Paraná above its junction with the Paraguay, offers less easy and less continuous navigation. The use of small motor-boats is gradually making available for transit the rivers which flow between the ridges of hills into the Paraguay.

Asunción has direct rly. communication with Buenos Aires. A steam train-ferry crosses the Alto Paraná from Encarnación in Paraguay to Posadas in Argentina, and links the Central Paraguay rly. with the Argentine North-Eastern. Paraguay has altogether 713 m. of rly., and 150 m. of all-weather roads; total road mileage is 3,759 m. There are three airports, served by Brazilian and Paraguayan aeroplanes.

Almost the whole foreign trade passes through Buenos Aires. Quebracho extract from the tree of the same name, used in tanning, is a valuable product, and still more so is the *yerba maté*, gathered wild and also grown in plantations, which provides the popular beverage of Argentina, Uruguay, and Chile. The pastoral industry has made great advance through improvement of breeds, and through the establishment of freezing and canning plants. The chief exports are hides, *yerba maté*, tangerine, orange, tobacco, timber, meat, cattle, and quebracho extract. Foreign war, civil strife, political disturbances have retarded progress;

PARAGUAY: THE LAND & THE PEOPLE

* Capt. Grenville Holmes

Further information will be found in the articles on the towns and rivers of Paraguay. See also South America; Jesuits

Paraguay, or La República del Paraguay, is a S. American republic forming part of the Río de la Plata system. It has no sea coast, but possesses access to the Atlantic by the open waters of the Río de la Plata. Paraguay proper, the main



Paraguay arms

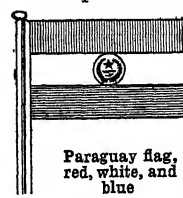
and more settled part of the country, forms an irregular rectangle, about 65,000 sq. m. in extent, bordered by the river Paraná and its great affluent the Paraguay, which gives its name to the republic. These streams separate Paraguayan territory from Argentina on the W., S., and S.W., and from Brazil on the E.

To the N. the river Apá forms the Brazilian boundary. Besides this clearly defined main territory, the republic owns the vast region of the N. Chaco, probably about 50,000 sq. m., separated from the Argentine Chaco to the S.W. by the river Pilcomayo, and from Bolivia to the N.W. by an arbitrary frontier line. The Paraguayan Chaco is a region quite distinct from Paraguay proper. Most of it lies within the tropics, and is a country of forest and swamp with intervening grassy savannas, of winding rivers, affluents of the Paraguay, which frequently shift their course and overflow their banks. Settlement by white men is only beginning in the Chaco, and tribes of Indians still in a state of savagery inhabit the river banks.

Paraguay is traversed in its N. part by the Tropic of Capricorn. Thus the climate is between tropical and subtropical. The summers are hot and bring a plague of insects, especially near the rivers; the winters are warm, but temperate and agreeable. The rainy season is in summer. A great part of the country is clothed with

magnificent forest yielding many kinds of valuable and beautiful timber, varied by abundance of flowering shrubs. Ranges of hills, seldom exceeding 1,500 ft. alt., rise above grassy plateaux admirably adapted for pasture. The rich soil responds readily to cultivation and can produce all tropical and subtropical fruits. The river Paraguay provides a splendid natural waterway from N. to S.

The pop. was estimated at 1,141,332 in 1945. Asunción, the capital and chief port, situated on the left bank of the Paraguay opposite the mouth of the Pilcomayo, has 130,067 inhabitants; Villarrica 31,081; Concepción, a port on the Paraguay, 16,487. The people are of Spanish, Indian, and mixed Spanish and Indian descent.



Paraguay flag, red, white, and blue

The country is bilingual: an aristocracy of European or mixed origin fills the chief official posts and the ranks of the professions, and speaks Spanish. The peasantry and working classes speak Guarani, the language of the extinct Guarani Indians who inhabited the country when the Spaniards arrived. More perhaps than in any other S. American republic the Indians have been adopted into the social scheme and have tranquilly accepted this arrangement, of which the foundations were laid by the conquistadores of the 16th century. The stormy history of the republic and its peculiar social system have precluded any marked literary development. There is a prolific newspaper press.

CONSTITUTION. Under a new constitution ratified by plebiscite Aug. 4, 1940, the president was accorded considerable powers.

so also have scanty population, primitive methods of life, scarcity of labour and of machinery.

HISTORY. The history of Paraguay since the Spaniards arrived in the early 16th century comprises two distinct stories, that of the early Spanish settlement at Asunción, and that of the singularly interesting Jesuit missions on the Alto Paraná. It is a fallacy to find the origin of the republic in the missionary work of the Jesuits. Those missions certainly facilitated the growth of Asunción and of the other Río de la Plata settlements, including Buenos Aires, by the orderly pacification of a neighbouring territory and by providing some defence against enemies, whether European or indigenous. But the curious politico-religious community founded by the Jesuits was virtually a separate and rival state, remote and excluded from the Spanish settlements. It lay chiefly within the present confines of the Argentine republic; and after the expulsion of the Jesuits in 1767 and before the birth of the Paraguayan republic, which sprang in fact from Spanish conquest and settlement in the region of the river Paraguay, it virtually ceased to exist.

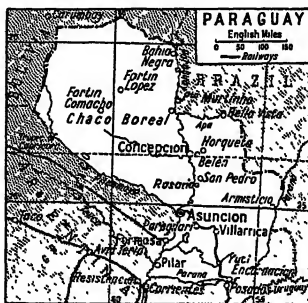
Founding of Asunción

The early exploration in these regions by Sebastian Cabot and others can only be mentioned here. Continuous history begins with the foundation of the city of Asunción in 1536. When, five years later, the infant Spanish settlement at Buenos Aires was abandoned, Asunción, in the country of the peaceable and amenable Guaranis, became the capital of the whole Río de la Plata region, and the headquarters of all Spanish enterprise upon the Atlantic side of the continent. Buenos Aires, refounded in 1580, was a colony from Asunción, and did not receive separate administrative recognition until 1620. But to a much later period the term Paraguay was commonly used to designate the whole Río de la Plata region as far as Patagonia. However, from 1620 to 1776 Paraguay proper was a distinct province, with a royal governor residing at Asunción and subordinate to the viceroy of Peru.

The true founders of Paraguay were the conquistadores and governors of the 16th and early 17th centuries, of whom the most notable were appointed by the Spanish settlers themselves, by virtue of a decree which empowered them to elect a governor in case of accidental vacancy. The early settlers

put a liberal interpretation upon this privilege, deposing and replacing unpopular governors upon occasion. Later the municipality of Asunción claimed the exercise of this privilege; and this almost self-contained Spanish settlement, remote from royal and viceregal authority, pursued a singularly agitated and independent political course.

In the middle of the 17th century the bishop of Asunción made himself governor with the support of the town council and citizens, defying superior authority until reduced by force of arms. Again, from 1720 Asunción acted almost like an independent city-state, accepting governors approved by the people and resisting all outside authority. Finally, in 1736, the revolt of the *comuneros*, the Paraguayan insurgents in Asunción, was put down by a regular military expedition from Buenos Aires,



Paraguay. Map of this South American republic

and the country reduced to submission. From 1776 to 1820 the province of Paraguay formed part of the newly-constituted viceroyalty of Buenos Aires.

In 1811 Buenos Aires, having achieved independence, sent a force up the river under Belgrano to offer to the Paraguayans independence and union with the Argentine provinces. Paraguay declined union but resolved upon independence, deposing the royal governor of Asunción, and setting up a local administration which soon merged into personal despotism under an able lawyer, Francia. From 1816 to his death in 1840 Francia exercised an absolute tyranny, a long reign of terror. He sealed up the country, forbade all commerce, all communication with the outside world, and, with rare exceptions, allowed no one to cross the frontier in either direction. Francia was succeeded by Carlos López, who opened the river to commerce, but continued Francia's system of internal tyranny. In

1862 he was succeeded by his son, Francisco López, an audacious megalomaniac who aimed at setting up a quasi-Napoleonic empire in S. America. He committed acts of war against Brazil, violated Argentine territory, and brought upon his country a combined invasion by the armies and ships of Brazil, Argentina, and Uruguay. During five years of war Paraguay was overwhelmed, devastated, and depopulated. When the struggle ended with the death of López in 1870, nearly all the men and most of the women had perished. Victory rested with the three allied republics, but the true heroes of the war were the poor Indian peasants of Paraguay, who, in frail canoes, attacked armed ships of war and struggled to the death against overwhelming odds.

The country has since suffered from a succession of internal conflicts and presidential "revolutions," though the degree of recovery from the catastrophe of 1865-70 has been remarkable. Paraguay remained neutral during the First Great War. The country broke off relations with Germany, Italy, and Japan Jan. 26, 1942, and declared war on Germany and Japan Feb. 9, 1945, but took no active part in the conflict.

Bibliography. A Vanished Arcadia, R. B. C. Graham, 1901; History of S. America, 1854-1904, C. E. Akers, 1904; Paraguay, W. H. Koebel, 1917; Paraguay, P. de Ronde, 1935; Une Civilisation du Miel: Les Indiens Guayakis due Paraguay, J. Vellard, 1939.

Parahyba. State and river of N.E. Brazil. The state, which has an area of 28,846 sq. m., fronts the N.E. coast and lies between Río Grande do Norte and Pernambuco. From March to June is the rainy season. The coast has several bays and the large estuary of the Parahyba river, all spoilt as harbours by coral reefs. Cotton, cotton-seed, and manioc (tapioca) are the principal products. The river rises in the mts. on the border of Pernambuco and flows E. for 270 m. Pop. 1,592,369 (est.). The capital of Parahyba state, also sometimes called Parahyba, is described under João Pessoa.

Parahyba do Sul. River of Brazil. It rises in the Serra do Mar in São Paulo, and flows N.E. across the state of Rio de Janeiro in a narrow valley to enter the Atlantic below Campos, after a course of 658 m., of which 150 m. are navigable.

Paraldehyde (C₆H₁₂O₃). Colourless liquid with burning taste and foul smell. It is used in

medicine to produce sleep, and is often employed as a safe hypnotic and as a narcotic to allay anxiety before an operation.

Parallax. In astronomy, the angular difference between the direction of a heavenly body as seen from the place of observation and as seen from some standard reference position.

The *annual* or *heliocentric parallax* of a star is the difference between the star's direction as seen from the earth and from the sun. In its restricted sense it is the angle subtended at the star by the radius of the earth's orbit. This angle can be measured by taking photographs of the star against a background of more distant stars at intervals of six months when the earth is at opposite sides of its orbit. It is a measure of the distance of the star. Even the nearest star (Alpha Centauri) has a parallax of only 0.75 second of arc (see Parsec).

The *diurnal* or *geocentric parallax* of the sun, moon, or planets is the difference between the direction of the object as seen from the centre of the earth and from its surface. If the object is directly overhead its geocentric parallax is zero; if it is rising or setting its parallax (now called the *horizontal parallax*) is equal to the angular radius of the earth as seen from the object, and is a measure of its distance. The sun's mean equatorial horizontal parallax, or *solar parallax* (8.79 seconds of arc) measures the sun's distance in terms of the earth's equatorial radius. The distance derived from this parallax is called the astronomical unit (*q.v.*).

The concept of parallax is thus connected with that of distance: large distances (parsecs) in terms of a base-line equal to the radius of the earth's orbit, smaller distances (astronomical units) in terms of a base-line equal to the radius of the earth. The word parallax has thus come to be used interchangeably with distance in astronomical parlance, and is now applied to distances where no measurement of an angle is attempted. Thus the *dynamical parallax* of a double star is its distance derived from observations of its orbit; the *mean parallax* of a group of stars is their average distance found from a knowledge of the sun's motion amongst them in space; and the *spectroscopic parallax* of a star is its distance calculated from its intrinsic brightness as revealed by its spectrum.

In photography, as the viewfinder of a camera cannot normally be in the same axis as the taking lens, there is a lateral error in positioning, known as parallax, which increases the nearer the object is to the camera. In the more expensive apparatus compensation is introduced by coupling devices which tilt the finder or focusing screen as the focus is altered so as to bring visible and recorded images into coincidence. If there is no such compensation the error must be allowed for.

Similar errors in the reading of instruments may arise when the indicator of the instrument and the scale against which the indicator is to be compared are separated. Any movement of the observer's head will cause him to see the indicator intersect the scale at different positions. Care must be taken to keep both eye and indicator in a plane at right angles to the scale. Some instruments, *e.g.* mercury barometers, incorporate devices which ensure that such errors of parallax are eliminated.

Parallel. In geometry, term used for straight lines in a plane which do not meet however indefinitely they are produced, *i.e.* they always remain at the same distance from each other.

By an extension of the Euclidean definition, it is used for things that are similar, *e.g.* parallel passages in literature. In electricity, accumulators are said to be connected in parallel when all the positive poles are connected to one wire and all the negative poles to another.

Parallelepiped. Solid figure contained by six parallelograms of which every two opposite faces are parallel. A brick is a rectangular parallelepiped.

Parallelogram of Forces. In mechanics, a rule for finding the resultant of two forces. The rule is as follows. If two forces acting at a point O are represented in magnitude and direction by two straight lines O A and O B, they are together equivalent to a single force, represented by the diagonal O C of the parallelogram constructed on the two straight lines passing through the point. The rule also applies to displacements and velocities or any vector quantity. The rule is implied in Sir Isaac Newton's second law of motion. See Vector.

Paralysis. Loss of power to contract muscles voluntarily. Two widely different forms occur, namely hysterical paralysis, which is a manifestation of a neurosis

and is not associated with recognizable changes in the nerves, and organic paralysis, due to disease or destruction of a nerve tissue.

Hysterical paralysis frequently follows a severe shock, either mental or physical, and is associated with many disorders of the mind, and nervous balance. Functional paralysis may follow an organic injury, with or without involvement of a nerve, which has necessitated the patient's keeping a limb in a fixed position (as in a splint) for a considerable time. Any form of organic paralysis may be simulated by the functional type. A group of muscles alone may be affected, or there may be paralysis of an arm or a leg, or of more than one limb. With the loss of power in the muscles there may be loss of sensation in the skin. An hysterically paralysed limb may be quite limp and flaccid, or there may be a firm contracture of groups of muscles, the latter condition being more frequent after a wound.

Hysterical paralysis is due to a fixed idea in the mind of the individual, following the shock he has received, that the limb is actually powerless, an idea which it is often difficult to dispel. Treatment accordingly is directed towards breaking down this resistance and inducing him to use the affected muscles. Sometimes recovery occurs suddenly, as a result of a shock or fright. Usually, however, recovery under treatment is brought about by suggestion treatment and re-education in the use of the muscles.

Organic paralysis is a symptom of many diseases of the nervous system which are accompanied by degenerative changes in the nerves, or it may be the result of injury to a nerve. When the nerve which is the immediate supply of a group of muscles is severed, *e.g.* by a bullet, the paralysed muscles are limp, show marked wasting, and eventually lose the power of reacting to electrical stimuli. Paralysis may also be due to injuries of nerves or nerve centres which do not immediately supply muscles, but control the nerve cells which do supply the muscles, as in the paralysis of limbs following an injury to the brain, or in a case of a haemorrhage into the brain from rupture of an artery, as in apoplexy.

The diseases most frequently responsible for organic paralysis are apoplexy, disseminated sclerosis, and anterior poliomyelitis (infantile paralysis).

Paralysis Agitans or **SHAKING PALSY**. Chronic disease of the nervous system. It usually occurs in people past middle life, men being more frequently affected than women, and is incurable. The cause is unknown. The disease comes on gradually, and is characterised by tremor, which may occur in the hands or feet or both. Movements of the thumb and fingers resemble those that would be made in rolling a pill. Sometimes the head is also affected by the tremor. Weakness of the muscles occurs, and the movements of the limbs become slow and stiff. The attitude of the patient is characteristic, the head being bent forward and the back bowed. In walking he leans forward. The face is characteristically without expression, blank, masklike.

Paramaribo. Capital and chief seaport of Surinam (Dutch Guiana). The city is situated at the confluence of the Surinam and Commewine rivers, some 10 m. from the sea, and is served by steamship lines and airways. The commodious harbour, taking vessels of 19-ft. draught, has two forts—Zeelandia and New Amsterdam. Coffee, cocoa, sugar, and rum are exported. Pop. 60,723.

Paramoecium or **SLIPPER ANIMALCULE** (Gr. *paramēkēs*, oblong). Lowly infusorian animal belonging to the Protozoa. Just visible as a speck to the naked eye, it is common in infusions of decaying vegetable matter, and can usually be secured by steeping rotting leaves in water for a few days. It is oval and flattened in form, one end being thicker than the other, and it swims freely by means of the vibratile cilia with which it is covered. There is no stomach, the food particles being assimilated by the body protoplasm generally. Reproduction takes place by fission, each animal splitting into two, and by a complex sexual process.

Paraná. Second largest river in S. America. With the Uruguay, it occupies the Plate Basin between the Brazilian Highlands and the Andes of Bolivia; it drains the great lowland which extends N. from Buenos Aires to the Matto Grosso. The Paraná begins at the confluence of the Paranahyba and Rio Grande, flows S.W. as far as Posadas, W. until it receives the Paraguay, and then S.S.W. past Corrientes to Rosario, whence it goes S.E. to the Rio de la Plata. In its upper course in Brazil it receives many rapid rivers. Above the great Guaira Falls the main stream is navigable for 400 m.

Below the falls the Paraná forms the boundary of Paraguay; below Posadas are the Falls of Apipé, below which navigation is uninterrupted for vessels of 300 tons. Below Corrientes it flows through Argentina past La Paz, Santa Fé, Paraná, and the great river port of Rosario; in this section it receives its second great tributary from the Andes, the Salado. Its total length is estimated at 2,800 m. It was first ascended as far as the Paraguay by Sebastian Cabot in 1526.

Paraná. State of S. Brazil. It extends between the Paraná river on the frontier of Paraguay and the Atlantic Ocean. The Serra do Mar rises sharply from the shore as part of the Brazilian Highlands, from which the long slope to the W. is drained by the Paranapanema, Ivahy, Piquiry, and Iguassú, all affluents of the Paraná river. The W., the narrow coastal lowland, and the mts. are all forested, and the forested lowlands are hot, damp, and unhealthy. Much timber is cut from the forests. Maté, cotton, cereals, and fruits are cultivated on the fertile uplands, and rice on the coastal lowlands. Deposits of coal exist. Curitiba is the capital. The state covers 93,269 sq. m. Pop. est. 1,328,804.

Paraná. City of Argentina, capital of the state of Entre Rios. Situated on the river Paraná



Paraná, Argentina. Plaza and cathedral of S. Miguel

opposite Santa Fé, with rly. connexions with Concepción on the Uruguay, and with Buenos Aires, 350 m. to the S.E., it is an important river port and exports the agricultural produce of the state. The cathedral is reputed to be the most beautiful in Argentina. Local industries are flour milling and meat packing. From 1852 to 1861 Paraná was the capital of Argentina. Pop. 78,284.

Paranagua. Seaport of Brazil. Situated on the bay of the same name in the state of Paraná, it

has rly. connexion with Curitiba, 80 m. to the W., São Paulo, and Rio de Janeiro, and daily air services. Maté, sugar, rice, and cereals are exported. Pop. est. 6,000.

Paranahyba. River of Brazil. One of the headstreams of the Paraná, its waters ultimately reach the Plate estuary. W. of the Brazilian Highlands, a wide depression extending to the Goyaz Plateau is occupied by the Paranahyba and Paraná, which flow S.W. for 500 m. and receive numerous tributaries from the heights on both sides. The name Paraná is applied to the main river below the confluence of the Paranahyba with the Rio Negro. The Paranahyba separates the Brazilian states of Goyaz and Minas Geraes.

Paranoia. A mental disorder in which a delusion is unusually permanent. Its development is slow, and there may be remissions of the disease. It is more common in males than in females. In a typical case it shows four stages: (1) Withdrawal of interest from outer life and other people on to the self, together with a tendency to refer things heard or read to the self, and to regard them as slights or insults; there may also be hypochondriacal tendencies. (2) Delusions of persecution, sometimes accompanied by hallucinations. They are often of a religious

or erotic type. (3) Ideas of grandeur form, and sometimes anti-social and even dangerous tendencies. Hatred takes the place of affection in human relations. (4) In some cases the withdrawal of interest becomes more marked and there is a degradation of personality. Mild attacks of a paranoid nature

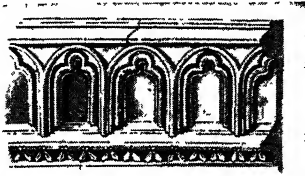
occur in the sick, especially after operations or childbirth.

Freud considers that the root cause of paranoia is a homosexual fixation. This is successfully repressed until some strain or frustration arouses a wave of homosexual feeling which overcomes the repressing forces. Then the forbidden longing returns to consciousness in a disguised form.

Amber Bianco White

Parapet (Ital. *parare*, to guard; *petto*, breast). Term in architecture denoting a low wall rising from

the lower level of a roof. In the medieval castle it was usually battlemented, and the more elabo-



Parapet. Example of Early English parapet in Salisbury Cathedral

rate examples also pierced with tracery. The parapet was revived in Georgian architecture, in combination with the hipped roof, but in the form of a balustrade.

As a military term a parapet is the head cover provided on the forward face of a trench or fortification to protect the occupants from the effects of fire or fragments of projectiles bursting in front of the position. *See* Battlement; Castle; Entrenchment.

Paraphernalia (late Lat. from Gr. *para*, beside; *phernē*, dower). Term of English law. It is descriptive of articles of personal adornment and apparel given by a husband to his wife, not as her absolute property, but for her use. Before the Married Woman's Property Act of 1870, subsequently amended, he could sell them or otherwise dispose of them, but on his death they became the wife's as against the husband's executors. The word has also acquired a more general meaning, more or less synonymous with miscellanea.

Paraphrase. Rendering in other words of anything said or written, generally for the purpose of elucidation. The recasting of the works of great writers into other words in the same language was a practice recommended by the ancient teachers of rhetoric to their pupils with a view to their obtaining command of vocabulary and syntax. Formerly paraphrase was restricted to such recasting of prose, metaphor being the term applied to poetry. The most famous example of paraphrase now generally known is the metrical version of the Psalms in use in the Presbyterian Church of Scotland. *See* Psalter.

Paraplegia. Medical term for paralysis which affects both sides of the body. *See* Locomotor Ataxia; Myelitis; Paralysis.

Pará Rubber Tree (*Hevea brasiliensis*). Tree of the family Euphorbiaceae. A native of Brazil, it has alternate leaves, divided into

five leaflets, finger fashion. The bell-shaped flowers are greenish white and the sexes separate. The tree abounds in a thin, milky juice which exudes when incisions are made in the trunk. It is collected in earthen vessels and hardened by exposing it to smoke, when it becomes crude rubber or caoutchouc. *See* Rubber.

Parasite (Gr. *para*, beside; *sitos*, food; *parasitos*, one who eats at another's table). Name given to an organism which lives at the expense of and in close contact with another organism, called the host. Parasites are common throughout the plant and animal kingdoms. Both parasite and host may be animals, e.g. the liver-fluke in the sheep's liver which causes liver rot. The parasite may be a plant, the host an animal, e.g. the fungus which in man causes athlete's foot. Both parasite and host may be plants, e.g. heath dodder which feeds entirely on various heath plants. The parasite may be an animal, the host a plant, e.g. green flies which pierce flowering plant stems and suck up sap. In a few animals the male acts as a parasite on the female, as in certain deep sea angler fish, the dwarf male of which becomes, when young, permanently fused to the female, thus obtaining its food via the blood of the female.

The extent of dependence on the host varies greatly. Some parasites live independently away from their hosts at certain stages, e.g. the hookworm passes through the early stages of its development in the open, the adult stage only infecting the intestine of man. A form like the flea is even more independent, passing from one host to another freely and often living without a host for days at a time. When related to their hosts endoparasites are internal, e.g. the malarial parasite, which lives in the red blood cells of its host. Ectoparasites, e.g. the flea, live on the external surface of their hosts. All parasites are small relatively to their hosts, and they often show certain modifications in structure; they tend, for example, to lose their organs of locomotion and of sense. The effects of parasites upon their hosts vary. Some live in a state of successful balance with their hosts, causing no marked ill effects; but others never achieve a successful relationship, and these pathogenic forms cause illness or death. Typhoid fever is caused by parasitic bacteria, sleeping sickness by a blood protozoan, and elephantiasis by a roundworm.

Parasites play an important part in controlling the balance of numbers in animal communities, since, by preying on others, they constitute one of the factors which prevent unchecked increase. *Consult* Bacteriology, C. H. Brown, 1925; Protozoology, C. M. Wenyon, 1926; Helminthology, Medical and Veterinary, H. A. Baylis, 1929; A History of Fishes, J. R. Norman, 1931.

Parasol (Ital. *parare*, to ward off; *sole*, sun). Light form of umbrella used for protection against



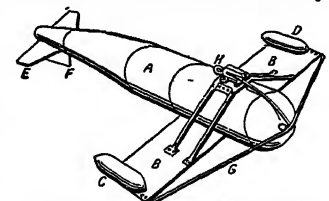
Parasol of paper, as used in Japan

the sun. Parasols are usually made of silk or other light material, although in China and Japan, where they are extensively used by both sexes, many are of coloured paper. Among some peoples the right to carry

a parasol is confined to the chiefs. *See* Umbrella.

Paratyphoid Fever. Disease resembling a mild form of typhoid fever. The incubation period is ten days, and a temperature lasts perhaps 18 days. Isolation is necessary and the treatment is the same as for typhoid fever (*q.v.*).

Paravane. Device to protect a ship against moored sea mines. Invented in the First Great War by



Paravane. Diagram of the main components of a paravane. A. Torpedo-shaped body. B. Hydrovanes. C. Weight. D. Float. E. Elevators. F. Rudder. G. Cutting blade. H. Hook for saw line

Commander C. D. Burney, and further developed in 1939-45, it consists of a torpedo-shaped body fitted with hydrovanes. Attached to one hydrovane is a float and to the other a weight. At the rear of the body is a rudder which, actuated by a hydrostatic valve, regulates the depth of flotation. The hydrovanes are so shaped that, when the towline becomes taut, the paravane submerges to the determined depth and sweeps out from the bow of the towing ship.

Stretched across the front of the paravane is a serrated blade which cuts through the mine's mooring. Paravanes are used normally in pairs, one on either side of the ship. See Mine.

Paray-le-Monial. Town of France. In the dept. of Saône-et-Loire, it stands on the Bourbince and the Canal du Centre, 48 m. W.N.W. of Mâcon, and is a junction of the Paris-Lyons rly. There are oil refineries, tanneries, and manufactures of tiles and ceramics. The most important building is the convent of the Visitation, where the nun M. M. Alacoque (d. 1690) was supposed to have had visions of the Saviour.

Parazoa. Zoological term used to denote the sponges (*q.v.*) in contradistinction to the protozoa and the metazoa. These three groups of animals are usually given the status of sub-kingdoms of the animal world.

Parcae. In classical mythology, the Latin name for the Fates, goddesses who presided over the destiny of man. The Greeks called them Moirai. See Fates.

Parcel Post. Postal service for the conveyance of bulkier and heavier packages than are carried by the ordinary letter post. In the U.K. a parcel post was recommended by Rowland Hill in 1842, but the scheme was not put into operation until 1883. Headquarters for the new dept. were provided in 1887, and a system of coaches started in 1892. As a result of the Crown Proceedings Act, 1947, proceedings may be brought against the crown for loss or damage to any registered inland postal packet due to wrongful act, neglect, or default of the Post Office. The amount recoverable cannot exceed the market value of the packet or the sum covered by registration fee.

Parchment. Writing material made of the skins of animals, especially those of sheep and goats. It is supposed to have been first used as a substitute for papyrus in the 2nd century B.C., and derives its name from Pergamum, a city of Mysia, where it was first employed. In preparing parchment the hair or wool is first removed, and the skin is then steeped in lime, stretched on a framework, and scraped with a special knife. After being sprinkled with powdered chalk or lime, it is again rubbed to make the surface smooth. Coarse parchment is made of the skins of he-goats, calves, or asses. Parchment as writing material was superseded by paper.

Pardo-Bazan, EMILIA, COUNTESS (1852-1921). Spanish writer. Born at Corunna, Sept. 16, 1852, she was brought up amongst a brilliant society in Madrid. After marrying Don José Quiroga, she travelled in Europe, and divided her home-life between Madrid and Galicia, becoming an industrious writer, a leading spirit in the Spanish feminist movement, and an eloquent public speaker. Among her works are realistic novels, literary studies, and descriptions of her travels. She died May 12, 1921.

Pardon. Legal term for the forgiveness of a crime. It is in all countries the peculiar prerogative of the head of the state; although in constitutional countries he always acts upon the advice of his ministers. In Great Britain the king has the sole right of pardon and the home secretary advises him. He also has the legal right of pardon over the whole empire; but in practice he does not interfere in the dominions or colonies, where the exercise of the prerogative is left in the hands of the governor or governor-general. Remission of a sentence found to be mistaken is granted by a pardon. See Amnesty.

Pardon. Name given to popular religious gatherings and village feasts in Brittany. In rural districts, where the pardon is primarily devotional and associated with the quest of absolution, or cure of some bodily ill is the object of pilgrimage, the ceremonial begins overnight with vespers. Mass is said at 3 a.m., there is a procession in the afternoon, and sometimes one in the evening.

Pardubice. Town of Czechoslovakia, in Bohemia. It is 65 m. by rly. E. of Prague on the route to Brno, and stands on the Labe. Spirits, sugar, farm machines, flour, and timber products are manufactured. The ruined castle of Kunetzitz (1,000 ft.) crowns an isolated hill N. of the town. Pop. 44,557.

Paré, AMBROISE (1510-90). A French surgeon. Born near Laval, Mayenne, he was apprenticed to a barber-surgeon. In the army he gained such distinction that, although a Protestant, he became surgeon to Henry II and three other kings, Charles IX saving him at the massacre of St. Bartho-

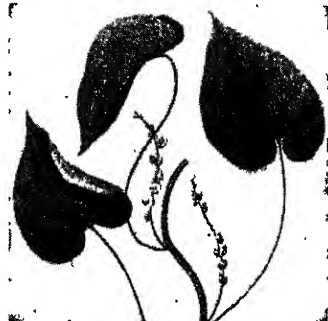


Ambroise Paré,
French surgeon

lomew. He wrote on gun-shot wounds and anatomy, in *Anatomie Universelle*, 1550, and was the first to use ligatures for arteries after amputation, his rational treatment earning him the title of father of modern French surgery. Paré died Dec. 22, 1590.

Paregoric. Camphorated tincture of opium. It is used as a sedative in conditions associated with irritating cough.

Pareira Brava (*Chondrodendron tomentosum*). Climbing shrub of the family Menispermaceae. It



Pareira Brava. Foliage and sprays of, left, flowers, and, right, seeds

is a native of Brazil and the W. Indies. It has roundish leaves with the leaf-stalk attached to the middle, and silky on the underside. The flowers are greenish, in sprays, and the sexes separate. From the dried root a substance called pelosine is obtained, better known by the name of pareira brava.

Parent (Lat. *parere*, to bring forth). Primarily a father or mother. The word is also used for anything that begets something else, *e.g.* a parent plant. The complement of parent is child, and in all civilized countries a body of law deals with the duties of parents towards their children. See Children, Law about; Family.

Pares, SIR BERNARD (1867-1949). British scholar, born March 1, 1867. From Harrow he went to Trinity College, Cambridge. He specialised in Russian language, literature, and history, becoming professor in these subjects at Liverpool, 1908-17, and at London, 1919-36. He was director of the school of Slavonic and E. European studies, 1922-39, and lectured in American universities during the Second Great War. Pares, who was knighted in 1919, after service at the British embassy to Russia, published a *History of Russia*, 1926; *My Russian Memoirs*, 1931; *The Fall of the Russian Monarchy*, 1939. He died in New York, April 17, 1949.

Pargasite. Name sometimes given to green and greenish-blue varieties of hornblende (*q.v.*) found at Pargas, in Sweden.

Parham. Village of Sussex, England, 10 m. S.E. of Petworth. The church of S. Peter is noteworthy. Parham Park, with its deer and a famous heronry, is the property of Viscount Cowdray. The house was built in the time of Elizabeth, her arms and date, 1583, being on the wall.

Parhelia (Gr. *para*, beside; *helios*, sun). Name for the mock suns of a solar halo. See Mock Sun.

Paria, GULF OF. Almost enclosed arm of the sea in N.E. Venezuela. The island of Trinidad is separated at its N.W. corner from the peninsula of Paria on the mainland by the passage called the Dragon's Mouth, and at its S.W. by that of the Serpent's Mouth from the Orinoco delta. These passages, discovered and named by Columbus in 1498, connect the Gulf of Paria with the Atlantic Ocean. The gulf receives the Guanipa and the Manamo, and is 100 m. from Trinidad to its most westerly point in the prov. of Sucre.

In 1946 a British company began drilling for oil in the gulf; the first tests were carried out off the coast of Trinidad adjacent to the existing land wells, and were extended over an area of 150 sq. m. of the ocean bed.

Pariah. Term popularly applied to natives of India who have no caste, and hence figuratively to any social outcast. The Paraiyans, drum-beaters, from whom they take their name, number over 2,000,000, mostly in Madras, are a low labouring caste with many sub-castes, and although they were traditionally classed as "untouchables" they actually rank higher than several true castes.

Parian Ware. Feldspar pottery fired at a moderate temperature. It is a pure white, marble-like substance, much used for figure work and vases.

Parima, SIERRA. South-western section of the Venezuelan Highlands. From Roraima, where British Guiana, Brazil, and Venezuela meet, an elevated region separates the tributaries of the Amazon from those of the Orinoco. This area is known first as the Sierra Pacaraima and in the S.W. as Sierra Parima. From the latter descend the Orinoco and its tributary the Ventuari.

Pari-Mutuel. French name for the method of backing horses by means of a machine known in the U.K. as a totalisator (*q.v.*).

Parini, GIUSEPPE (1729-99). Italian poet and satirist. Born at Bosisio, near Milan, May 22, 1729,

he became a priest in 1754, but is chiefly memorable for his satiric poem, *Il Giorno* (The Day), in four parts—Morning, Afternoon, Evening, and Night. The first part, *Mattina*, 1763, created something of a sensation on its publication. Written in blank verse, the poem gives wonderful pictures of contemporary manners. Parini published about a score of odes, and in 1795 issued his *Epistle to Sylvia*. He died Aug. 15, 1799.

Pari passu (Lat., with equal pace). At the same time and rate.

Paris. Small genus of perennial herbs of the family Liliaceae. They are natives of Europe and temperate parts of Asia. They have creeping rootstocks, a simple stem, a single whorl of from four to nine leaves, and a solitary yellow-green flower, succeeded by a black berry. See Herb Paris.

Paris. In Greek legend, son of Priam and Hecuba. Soothsayers having foretold that Paris would bring calamity on Troy, the infant was exposed on Mount Ida, and

cared for by shepherds, but afterwards, becoming aware of his origin, was received again into the royal household. While still a shepherd on Ida he delivered his famous judgement. The goddess of strife, enraged at not having been invited to the marriage of Peleus and Thetis, had thrown a golden apple among the guests, inscribed "for the fairest."

Hera, Athena, and Aphroditē each claiming the apple, Zeus ordered them to submit to the judgement of Paris. Hera promised Paris sovereignty, Athena, military glory, and Aphroditē, the most beautiful woman in the world. Paris gave the apple to Aphroditē, who caused Helen, wife of Menelaus of Sparta, to fall in love with Paris. He carried her off to Troy, and thus provoked the Trojan War. During the war Paris distinguished himself little. He was worsted in combat with Menelaus, and was only saved by being carried off the field by Aphroditē. He is credited, however, with having caused the death of Achilles by shooting him with an arrow in the heel. On the taking of Troy, Paris was wounded by one of the poisoned arrows of Philoctētēs, and repaired to his long deserted wife, Oenōnē, a nymph of Mount Ida, who refused to heal him, and he returned to Troy to die. See Helen of Troy.



Giuseppe Parini,
Italian poet

PARIS: THE CITY AND ITS HISTORY

Nora Beloff, Paris Correspondent of The Observer

Further information concerning the French capital is given in articles on the city's famous buildings, e.g. *Invalides*; *Louvre*; *Notre Dame*. See pictures facing page 6353; see also France

Paris, the capital of France, is on the River Seine and is situated in the modern dept. of the Seine which is in the heart of the medieval prov. of the Île de France. It is 240 m. by air from London (Northolt to Le Bourget), and 285 by rly. and steamer via Dover and Calais.

Paris proper extends over an area of 40 sq. m. of which one-third is covered by buildings. Pop. 1946, of the city, 2,725,374; of the dept. of the Seine, which covers the city's outer suburbs, 4,775,711 (including 194,192 foreigners). Thus almost one in eight of the French people lives in or around Paris, which is more densely populated than any other major European capital.

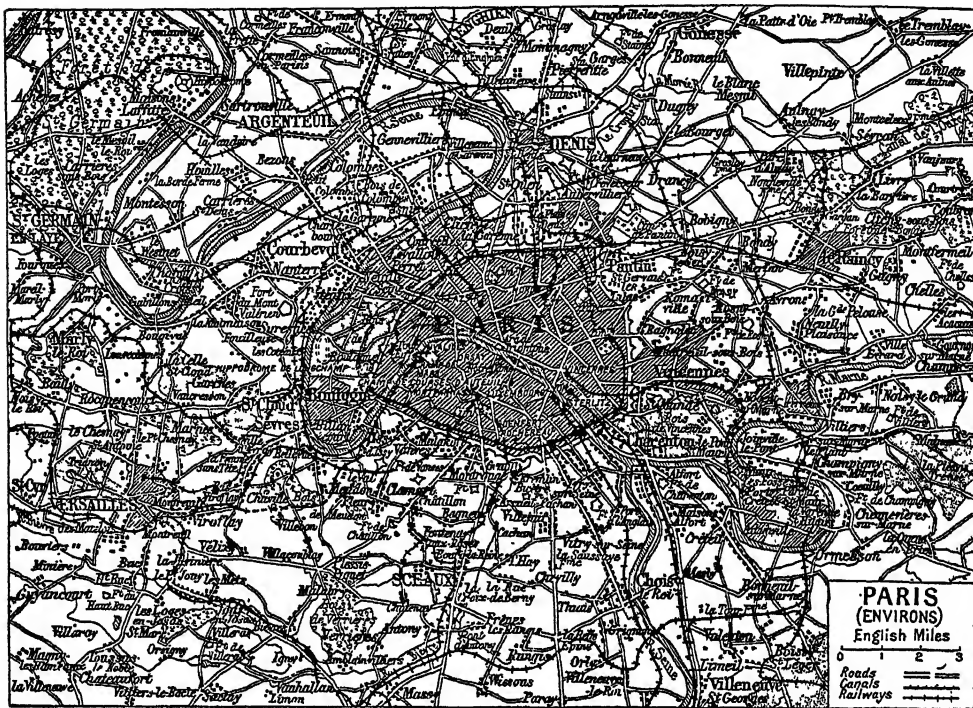
Thirty-two bridges span the river as it runs through Paris. Ridges of

hills rise on either side. On the right bank, the ridge starts at Bercy in the E. and runs to Passy in the W. Its highest point is the hill of Montmartre, 410 ft. high, from which the domes of the Neo-Byzantine basilica of the Sacré Coeur, built after the Franco-Prussian war, dominate the city. On the left bank the hills, which are lower, stretch from the Butte aux Cailles to Meudon and St. Cloud. The dominating monument is the 18th century church, secularised during the Revolution as "Le Panthéon," built on the hill of S. Geneviève which rises to 213 ft.

The city's original kernel, the Île de la Cité, still contains two of Paris's finest surviving monuments of Gothic architecture: the cathedral of Notre Dame (12th and 13th century) and La Sainte Chapelle (13th century). On the W. of the island stands the Palais de Justice (the law courts), most of it



Paris arms



Paris. Map of the city and its environs, showing the network of railways which connect the business centre with the suburbs

19th century imitation of the original buildings, of which the earliest were Roman. Survivals of the pre-revolutionary palace are the clock tower and the prison of the conciergerie. Paris's police h.q. in a vast squat edifice, the Préfecture de Police, replaced under Napoleon III the old narrow streets of the isle. The administrative centre, the Hôtel de Ville, is opposite the isle on the N. bank.

The city is divided roughly into equal quarters by the great highways intersecting at the Place du Chatelet, N. of the Île de la Cité. From E. to W. the following streets form a single artery: la rue du Faubourg Saint Antoine, rue Saint Antoine, rue de Rivoli, avenue des Champs Elysées, avenue de la Grande Armée. From N. to S. the artery runs through the boulevards: of Strasbourg, Sébastopol, the Palais de Justice (running across the isle), and Saint Michel, and then up the rue Denfert Rochereau and the avenue Général Leclerc (formerly avenue d'Orléans).

The central part of the city is bounded on the N. and on the S. by a series of main roads which form an oval. The N. curve starts at the Place de la Bastille, where a

column commemorates the fall of the royal fortress in 1789. It follows the large avenues known as the Grands Boulevards, centres of business, shopping, and amusements, leading to the early 19th century church of La Madeleine. Thence it turns down the Rue Royale, leading to La Place de la Concorde, and across the Concorde bridge to the national assembly, a much modified 18th century palace.

On the S. side, an inner arc starts from the Bastille and ends at the Concorde bridge, formed by two main roads: the boulevards Henri IV and St. Germain. As it crosses the river in the E. it touches the upstream point of the Île St. Louis which is joined by a bridge to its larger sister to the W., the Île de la Cité. An outer arc of boulevards to the S. runs over the crest of Montparnasse; a third ring encircles the city.

Approx. two-thirds of the city's surface is on the N. bank, bounded on E. and W. by two vast parks: Bois de Boulogne and Vincennes.

The E. of Paris, rising to the slopes of Montmartre and Ménilmontant, is older and poorer than the W. Its heart is the region known as the *marais* (marshland), which contains some of Paris's

finest renaissance and 17th century buildings, and houses chiefly small traders and artisans. Westwards of the *marais* lies the business and commercial centre with the central markets (Les Halles), the stock exchange, the bank of France, and the great luxury avenues centring on the national state opera house.

Between this region and the river lies the Place du Louvre, now Paris's chief museum and, to the west, the gardens of the Tuileries.

W. of the Place de la Concorde lie the expensive residential quarters, the luxury hotels, the up-to-date theatres and museums, of which the central highway is the avenue des Champs Elysées stretching up to the Napoleonic Arc de Triomphe in the Place de l'Étoile, from which eleven other avenues radiate. One of these leads to the Place du Trocadéro, with a magnificent view towards the Eiffel Tower, and here another series of wide avenues converge.

The outer regions of N. Paris are mainly industrial, notably the N.E. In the working-class suburbs of Aubervilliers and St. Denis can be found the capital's worst slums and most revolutionary population, and also the abbey of St. Denis containing the royal tombs.

On the S. side of the river, the E. is also mainly popular and industrial. The two principal parks are the Jardin des Plantes, which contains one of Paris's zoological gardens, and the Jardin du Luxembourg, attached to the 17th century palace which houses the upper chamber of parliament, the *conseil de la république*. To its N. lies Montparnasse, the counterpart of Montmartre as a cosmopolitan intellectual and artistic centre.

Between the Luxembourg and the river lies the university and students' quarter centring round the Sorbonne, i.e. the central university building, La Faculté de Droit, École de Médecine, École des Beaux Arts. The student population, one of the largest in the world, can no longer find room within the restricted *quartier latin*. The more fortunate now reside at the Cité Universitaire beyond the Parc Montsouris, in a southern suburb, made available by the dismantling of the Paris fortifications after 1919.

Westwards of the university lies the fashionable 18th century residential quarter of the Faubourg St. Germain, where private palaces have been transformed into em-

bassies and public buildings. Many govt. offices are situated in the rue de Varennes, rue de Grenelle, and rue de l'Université. They stretch W. as far as the Invalides, near which, on the Quai d'Orsay, stands the present French Foreign office.

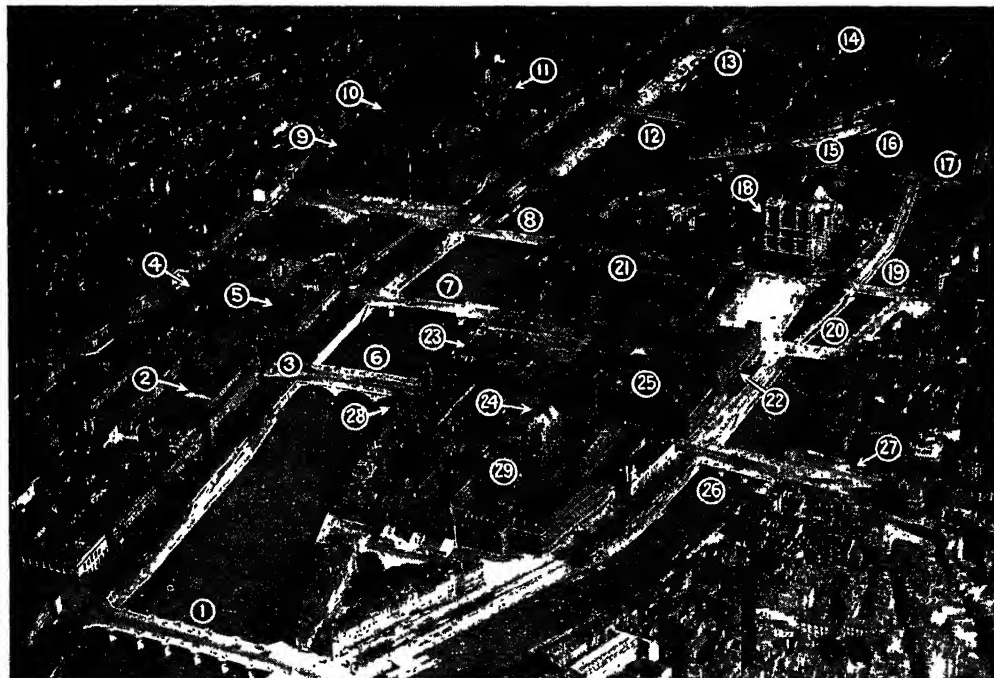
The Invalides, with a golden dome which is one of Paris's finest landmarks, is surrounded by vast open squares. Near it stands the École Militaire, between which and the river stands the steel Eiffel Tower, the world's first skyscraper, bestriding the Champs de Mars and looking across at the Place du Trocadéro. To the S. and W., working-class and industrial suburbs spread shapelessly outward.

The principal libraries of Paris are the Bibliothèque Nationale, Bibliothèque Municipale, Bibliothèque Mazarine. The principal museums are the Louvre (European art down to current times, Egyptian and Near Eastern arts); Musée Guimet (Far Eastern art); Cluny (medieval art); Carnavalet (history of Paris); Invalides (history of the army); Musée de l'Homme (ethnology); Musée de l'Art Français (casts of French sculpture); l'Orangerie, Le Jeu de Paume, temporary exhibitions.

HISTORY. When conquered by Julius Caesar in 53 B.C., Paris was the capital of a small Gaulish tribe living by shipping. Roman Paris spread from the Île de la Cité to the left bank but, by the end of the third century, barbarian onslaughts forced the population back into the easily defensible island. In 508, Clovis made Paris one of his residences and, three years later, S. Geneviève—the city's patron saint, to whom legend attributes the city's resistance to Attila—died there.

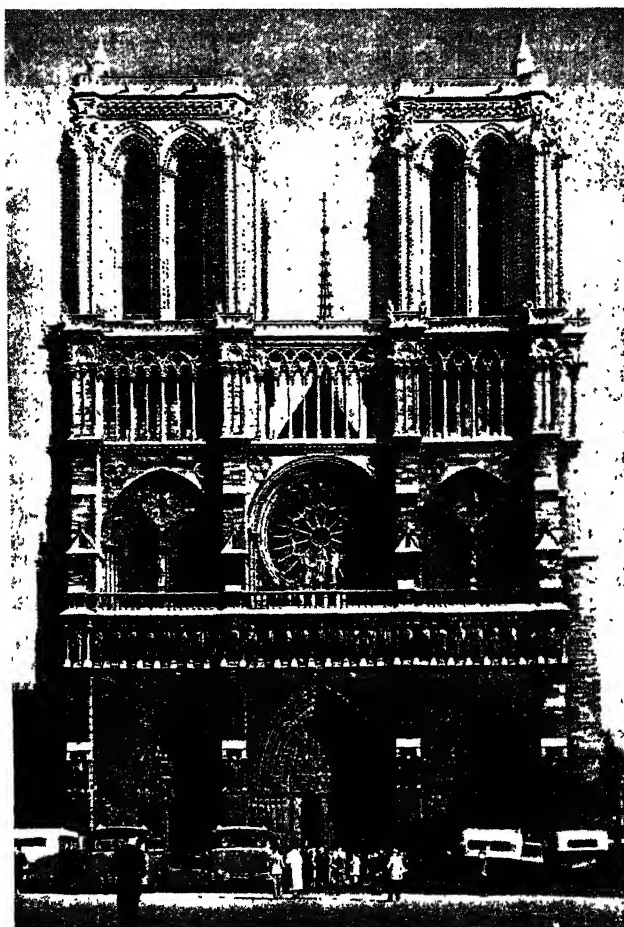
When the counts of Paris became kings of France in the ninth century, Paris's pre-eminence and her prosperity as a trading centre and port were assured. Her municipal arms, showing a sailing ship buffeted by the waves with the motto *Fluctuat nec mergitur* date from the 11th century.

Under Louis VI, Philip Augustus, and Louis IX, Gothic architecture and art flowered. In the 13th century Paris, the oldest university of Europe with 20,000 students, had become uncontestedly the intellectual capital of the W. In the 14th century, despite English aggression, invasion, internal strife, and an abortive muni-



Paris. Air view of the central part of the city, looking east. 1. Pont-Neuf. 2. Théâtre du Châtelet. 3. Place du Châtelet. 4. Tour S.-Jacques. 5. Théâtre Sarah-Bernhardt. 6. Pont au Change. 7. Pont-Notre Dame. 8. Pont d'Arcole. 9. Hôtel-de-Ville. 10. Barracks. 11. Church of S.-Gervais. 12. Pont Louis-Philippe. 13. Pont-Marie. 14. Île S.-Louis. 15. Pont S.-Louis. 16. Morgue. 17. Pont de l'Archevêché. 18. Notre-Dame. 19. Pont au Double. 20. Petit-Pont. 21. Hôtel-Dieu. 22. Barracks. 23. Tribunal de Commerce. 24. Sainte Chapelle. 25. Préfecture de Police. 26. Pont S.-Michel. 27. Place S.-Michel. 28. Conciergerie. 29. Palais de Justice

By courtesy of Compagnie Aérienne Française, Paris



Paris. The west front of the venerable cathedral of Notre Dame

principal revolt against royal authority by Étienne Marcel, Paris continued to expand and grow richer. In the 15th century the wars and the plague only partially interrupted the city's development; the 16th and early 17th centuries saw the building of the Tuileries, now destroyed, the oldest surviving parts of the Louvre, S. Étienne du Mont, S. Eustache, the Place Dauphiné, and the Place des Vosges.

In the 17th century Paris became indisputably the greatest capital of Europe. The Louvre was completed on a grandiose scale. The Invalides was built, as well as many churches, monasteries, hospitals, and buildings for social services, such as the Salpêtrière. During the same period of enlightened Bourbon despotism, Paris was better cleaned, and new security measures, including street lighting on moonless nights, were instituted. The expansion con-

tinued under Louis XV and included the construction of the Place de la Concorde and the Place Vendôme. The Concorde bridge was started in this reign, though completed only after the Revolution and embodying stones from the dismantled Bastille fortress so that Parisians could daily step on the symbol of royal tyranny. The Revolution cost Paris a number of medieval churches and chapels destroyed under the anticlerical reaction; but the expansion of the city was barely interrupted and attained new vigour under Napoleon. The Madeleine and the present national assembly, which balance each other on the N. and S. banks of the Seine, were either completed or transformed. The driving of wide streets through the city was initiated with the foundation of the rue de Rivoli and the Arc de Triomphe. Napoleon improved the administration, safe-

guarded public peace, and centralised marketing in the newly constructed *halles*.

In the 19th century Paris burst its bounds and tripled its pop., becoming a first-class industrial centre. The radical transformation of the city under Napoleon III was stamped by the controversial personality of Baron Haussmann, prefect of the Seine, whose passion for symmetrical lines, light, air, and easily defensible broad straight roads prevailed over respect for antiquity and art. His wide avenues bordered with trees which stretch in straight lines have opened up the centre of the old city, and old buildings and winding ways were ruthlessly obliterated. The regions of the Étoile and the Opéra catered for the new tastes in luxury.

The worst destruction inflicted at a single blow in all Paris's history came at the fall of the second empire in the clash between the Paris Commune and the govt. of Thiers established at Versailles. In their retreat, the Communards burnt down the Palais de Justice, the palace of the Tuileries, the Cour des Comptes and the palace of the Legion of Honour. The Sainte Chapelle was saved because the fuse went out before the flame reached the powder barrel.

In the early decades of the Third Republic, world exhibitions bequeathed a series of disputed architectural assets which now mark the centre of the city: the Eiffel Tower, the Grand and Petit Palais (the former used for industrial, the latter for art, exhibitions), the bridge of Alexandre III, and, in 1937, the Palais de Chaillot—the new Trocadéro and the museum of modern art.

Paris suffered physically little during either of the Great Wars. Nevertheless the effects of the wars, the impoverishment of the nation as a whole, loss of population, and economic stagnation set their mark on Paris which, like the rest of the country, to some extent lived on past capital after the Second Great War was over. Inflation and social legislation blocking rents took profits out of building and, apart from a number of large shops, a few blocks of flats in the W. end of the city, and a number of churches built by subscription during the R.C. revival of the thirties, the expansion of Paris—for the first time in centuries—ceased; buildings fell into disrepair, the city outside the expensive luxury centre became shabby and overcrowded.

Paris is no longer the unchallenged capital of world art and thought, though art and thought are still vigorous, but she retains pre-eminence in the world of fashion and is still the tourists' favourite playground.

ADMINISTRATION. Royal, imperial, and republican governments have always been jealous of the city's power, and have contrived to leave the capital less self-government than any other French city. The special regime under which Paris is administered precludes the 20 arrondissements into which it is divided from electing their own mayors or conducting their own executive business. A municipal council of 80 votes the municipal budget, and elects its president who carries out the ceremonial functions of a mayor. But effective executive authority rests with the prefect of police and the prefect of the Seine who share the services between them.

The municipality owns the underground railway system which provides convenient and swift transport, although it is permanently overcrowded and badly ventilated, while its financial management and the fares are government-controlled. Lighting and gas are organized by the nationalised services responsible to the state, not the municipality.

The state also owns the national state opera house and the state theatres, the Comédie Française and the Théâtre Richelieu, most productions in which are French classics. Paris finds compensation for her limited power of self-government in the highly centralised national life of France, of which she remains the centre.

Bibliography. *Histoire générale de la Ville de Paris*, published by the municipality from 1866 onwards; *Bulletins de la Commission du Vieux Paris*, from 1894 onwards; *Histoire de Paris*, Lucien Dubech and Pierre d'Espezel, 1926; *Vie d'une cité*, Marcel Poète, 3 vols., 1924-42; *Paris*, Hilaire Belloc, 1902; *A Wanderer in Paris*, E. V. Lucas, 1909; *From a Paris Garret*, Richard le Gallienne, 1943; *Guide Bleu*: Paris, 1947.

Nora Beloff

SECOND GREAT WAR. On June 3, 1940, Paris was raided from the air by the Germans, most of the bombs falling on the western outskirts; and as the fighting drew nearer hordes of refugees poured into the city. The govt. left Paris for Tours on June 11, and three days later the capital was declared an open city, the French army retiring to the S. The Germans

entered Paris on the same day. Many of the Paris factories had been destroyed or damaged to prevent them from being used by the Germans, but German specialists soon restarted them on the production of war materials; and the city became the centre of German govt. of occupied France. Unemployment rose steadily; and the food and fuel situation became critical. By Aug., 1941, poor families were on the verge of famine, and a black market sent prices soaring.

In March, 1942, the R.A.F. began a series of raids on Paris factories producing war materials for the Germans, the Renault, Farman, Salmson, Matford, and Goodrich works all being severely damaged. During 1943 an increasing number of hostages were shot in an effort to curb attacks on German military personnel and acts of sabotage; but the underground movement gained strength as the tide of war turned.

The Liberation of 1944

As the Allies were approaching Paris from the W. in mid-Aug., 1944, orders by the Paris liberation committee and the national resistance council led to a general strike and a rising which assumed serious proportions on Aug. 19. Fighting was particularly heavy near the Hôtel de Ville, in the Île de la Cité, and between the Porte d'Orléans and the Cité Universitaire. The F.F.I. gained control of a number of the chief buildings, and during the 20th the Germans negotiated an armistice and made a feint of leaving the city. Returning in force, they were met by tanks of the French 2nd armoured div. which entered the Porte d'Orléans in the evening of Aug. 24 and made contact with the F.F.I. in the Île de la Cité. The Germans resisted desperately in some sectors, setting fire to the Grand Palais, the ministry of Marine, and the Hôtel Crillon. The main body of the 2nd armoured div., led by Gen. Leclerc, entered the city early on the 25th and was joined during the morning by other Allied detachments. The commander of the German garrison signed an armistice in the evening, and at 7 p.m. Gen. de Gaulle arrived at the Hôtel de Ville. By nightfall the city was completely liberated from the Germans. Next day de Gaulle with members of the exiled govt. and of the resistance council marched in public to a service of thanksgiving for the liberation of Paris at Notre Dame, where he was shot at by Vichy snipers both

inside and outside the cathedral. A new govt. was immediately formed by de Gaulle in Paris; and on Nov. 7 the consultative assembly, which had first met in Algiers in Nov., 1943, met in Paris at the Luxembourg palace. Paris was once more the centre of govt. of the French empire.

Paris. City of Texas, U.S.A. The co. seat of Lamar co., it lies 97 m. N.E. of Dallas and 15 m. S. of the Red R. Served by rlys., it is also the headquarters of a long-distance commercial lorry service. Industries include cotton ginning, flour milling, and manufactures of cotton-seed oil, furniture, and bricks. Settled in 1874, Paris became a city in 1905. Pop. 18,678.

Paris, BRUNO PAULIN GASTON (1839-1903). French philologist. Born at Avenay, Aug. 9, 1839, son of the philologist Paulin Paris (1800-81), he became in 1895 director of the Collège de France, where he had succeeded his father as professor. His works and numerous contributions to periodicals deal chiefly with medieval French literature, of which he wrote a history. His biography of Villon is regarded by some as his best work. He died in Paris, March 6, 1903.

Paris, LOUIS PHILIPPE ALBERT, COUNT OF (1838-94). French prince. The grandson of Louis Philippe, he was born Aug. 24, 1838, and became the king's heir in 1842, retaining this position until the latter was deposed in 1848. He lived with his mother in Germany and England, and saw something of the American Civil War. He returned to France in 1871, remaining there until 1886, when he and his family were again exiled. He died Sept. 8, 1894, leaving two sons, known as the dukes of Orléans and Montpensier. He wrote a *History of the American Civil War*, 8 vols., 1874-75. *See Bourbon*; *Orléans*.

Paris, DECLARATION OF. Term applied to four articles for the regulation of maritime warfare drawn up and agreed to by the plenipotentiaries of the powers who concluded in Paris in 1856 the treaty of peace after the Crimean War. The four articles are; (1) privateering is and remains abolished; (2) the neutral flag covers enemy goods, with the exception of contraband of war; (3) neutral goods, with the exception of contraband of war, are not liable to capture under the enemy flag; (4) blockades to be binding must be effective, i.e. the blockading force must be able to prevent virtually all ingress and egress from the enemy coast.

The government of the U.S.A. was asked to subscribe, but refused. Spain and Venezuela also refused to subscribe. During the war between the U.S.A. and Spain, however, both nations agreed to conduct their maritime warfare in accordance with the principles of the Declaration. *See* Blockade.

Paris, TREATIES OF. Various international treaties signed in Paris. Used without qualification, the term generally refers to:

(1) First treaty of Paris, concluded May 30, 1814, by the Allies and France after the abdication of Napoleon I. France reverted generally to the frontier of 1790, but acquired territory round Mons and Philippeville and a portion of Savoy. Most of her colonies were restored, but Great Britain gained Mauritius, Seychelles, and islands in the West Indies, and the part of San Domingo formerly Spanish was returned to Spain. The treaty awarded Malta to Great Britain. A secret treaty signed at the same time bound France to the provisions of the congress of Vienna (*q.v.*).

(2) Second treaty of Paris, concluded between the Allies and France, Nov. 20, 1815, after the final overthrow of Napoleon. France lost most of her acquisitions under the former agreement and had to pay an indemnity of £28,000,000.

Also signed at Paris were:

(3) Treaty of Feb. 10, 1763, between Great Britain, France, and Spain, at the close of the Seven Years' War. France surrendered to Great Britain all her American possessions except Louisiana, though retaining fishing rights off Newfoundland. She regained Guadeloupe, Martinique, and Santa Lucia, her rival keeping Tobago, Dominica, St. Vincent, and Grenada. Territorial adjustments were made in Africa and India. Spain recovered the Philippines and Havana, but ceded Florida to Great Britain. (*See* Hubertusburg, Treaty of.)

(4) Treaty of March 30, 1856, between France, Great Britain, Russia, Turkey, and Sardinia, after the Crimean War. The Moldavian frontier was rectified, Russia lost control of the mouths of the Danube, and merchant ships were allowed complete freedom of entrance to the Black-Sea. A limit was placed on Russian and Turkish naval forces.

(5) The peace treaties signed between the Allied and associated powers on the one hand and Italy, Rumania, Hungary, Bulgaria, and Finland on the other, Feb. 10,

1947. All ex-enemy states except Finland presented notes of protest concurrently with signing. The terms are described in the articles on the countries concerned.

Paris Basin. Term applied by geologists and geographers to designate the general dip of the rocks downwards towards Paris from the edges of a roughly circular area which extends from the Ardennes to the Auvergne, and the Vosges to the Brittany Highlands. It embraces most of the Seine valley and part of that of the Loire. The downwarping occurred during the Tertiary period, and the basin is similar in origin to that of the London Basin.

Parish (Gr. *paroikia*, neighbourhood, from *para*, near; *oikos*, house). District committed to the care of one parson or minister having permanent cure of souls, known as the incumbent. The origin of the division of the country into parishes has been much disputed, some writers giving it an ecclesiastical ancestry, while others assert that the ecclesiastical parish system was based upon an earlier division for civil purposes. Parishes appear to have become general about the 9th or 10th century, possibly as the result of mission work radiating from the principal or bishop's church.

For civil purposes the parish is the smallest area, so far as local government is concerned. Its organization varies according as it is a rural or an urban parish. Most rural parishes have a parish council, its place in others being taken by the parish meeting.

The urban parish ceased to be an organ of local government in 1933. In ecclesiastical matters the vestry was formerly the council of the parish, but all its functions except those relating to the affairs of the Church and to charities have been transferred to parochial church councils in rural areas and to borough councils and urban district councils in other areas. In Scotland the parish ceased to exist as a civil administrative area in 1929. In ecclesiastical matters it is under the control of the general assembly. *See* Local Government.

Parish Council. Body which administers civil affairs of rural parishes which had such a council on June 1, 1934, when the Local Government Act, 1933, came into force, or in which a council has been established by order of the county council. The latter must establish a council in every rural parish with a pop. of 300 and also in parishes with a pop. between

200 and 300 if the parish meeting, consisting of the local government electors, so resolves. There are between 5 and 15 members elected every three years.

Parish Register. Register kept by parochial clergy for recording baptisms, marriages, and burials. It belongs legally to the parochial clergy, and is generally kept in the parish church. Copies of all entries are forwarded to the registrar-general. Parish registers began to be kept in England about the middle of the 16th century, but certainly existed in France 200 years earlier. Similar records were kept in ancient Athens and Rome. Before the 18th century it was usual for the entries to contain notes and comments, which provide much material for students of the period; but they developed into bare records, of merely legal interest. There was no law compelling the preservation of parish registers until 1812. Parish registers are to be distinguished from the records of births, marriages, and deaths kept by the registrar-general since 1836. The Parish Register is the title of a poem by Crabbe, 1807.

Park. Literally, an enclosed space. The word connotes either enclosed land round a large house, *e.g.* Chatsworth, Knole; or an open space set aside for the use of the public. The idea in both is that the land has been reserved.

National Parks (*q.v.*) are areas of country invested in national ownership and administered by the state for the enjoyment of the public.

A military park is an enclosed space for the storage of supplies, guns, etc.; also the actual material in such a space.

A car park is a place on public or private property on which vehicles may be left unattended. Local authorities in the U.K. may authorise the use of any part of a street as a parking place so long as this does not cause a nuisance. The liability of owners of a parking place depends on the terms of any contract made, but in general the owners merely allow drivers to leave vehicles at their own risk on the property. Public parking places are provided in many towns by local authorities. Some are merely marked off at the sides or middle of the road by white lines. The position of a car park is generally marked by a blue disk with a white P in the centre. After the Second Great War, London and other cities used as car parks some sites of buildings destroyed by German bombs.

Park, Sir Keith Rodney (b.1892). N.Z. airman. Educated at Auckland, and Dunedin, N.Z., he served with the R.F.C. and R.A.F. during the First Great War, becoming a leading air "ace." From 1919 onwards he held various staff appointments. In 1940



Sir Keith Park,
British airman

he organised fighter squadrons to protect Holland and Belgium and to cover the evacuation of Allied troops. When daylight attacks on the S. and S.E. coasts of England began in the summer of 1940, Park was in command of No. 11 fighter group, which bore the brunt of the air fighting in the battle of Britain. Later he was in charge of the R.A.F. in Egypt, and in 1942 took over the Malta Command, directing the island's defensive and offensive operations. In 1944 he became c-in-c. Middle East, and in 1945-46 was Allied air c-in-c. S.E. Asia Command. An air chief marshal, he was knighted, 1942.

Park, Mungo (1771-1806). British explorer. Born at Foulshields, Selkirkshire, Sept. 20, 1771,

he became a surgeon and in that capacity went on a voyage to India in the service of the East India Company in 1792. In 1795 he was employed by the African as-



Mungo Park,
British explorer

sociation to explore the Niger, and proceeded to Gambia, where, crossing the Senegal, he followed the Niger to within a short distance of Timbuktu.

His adventures, described in his *Travels in the Interior of Africa*, 1799, awakened great interest, and he was commissioned by the government to make another expedition in 1805. The attempt was disastrous. He had started with Anderson, his brother-in-law, and 45 British soldiers. Of this party only three soldiers were left when, after a canoe voyage of over 1,000 m., he reached the lower Niger. The end came near Yuri, where the canoe was upset and Park and his companions were drowned. One native rower escaped, from whom the facts were learned in 1812. *Consult* his *Journal*

of a Mission to the Interior, 1815; *Niger: The Life of M.P.*, L. G. Gibbon, 1934.

Park Avenue. Street of New York City. One of the main and fashionable thoroughfares of Manhattan, it continues Fourth Avenue above 32nd St. to the Grand Central terminus and thence from 45th St. to the Harlem river. It is lined with expensive blocks of flats in the middle section.

Parker, Sir Gilbert (1862-1932). British writer. Born at Addington, Ont., Canada, Nov. 23, 1862, he became a journalist. He drew on memories of the land of his birth for many novels, the best-known of which included *Pierre* and his *People*, 1892; *When Valmond*



Sir Gilbert Parker,
British writer

Came to Pontiac, 1895; *The Seats of the Mighty* (dramatised by its author), 1896; *Northern Lights*, 1909; *The Judgment House*, 1913; *There is a Man*, 1927. His autobiography, *Tarboe*, appeared in 1927. He was Conservative M.P. for Gravesend, 1900-18. Knighted in 1902, he was created a baronet in 1915. He died July 8, 1932.

Parker, Sir Hyde (1739-1807). British sailor. He was commissioned in the navy in 1758. He was knighted, 1779, for services in the American War of Independence. Made a rear-admiral in 1793, in 1801 he commanded the Baltic fleet against the Northern Confederation, with Nelson as second in command. The victory of the latter at Copenhagen, where Nelson put his blind eye to the telescope that he might not see Parker's signals to retire, led to Parker's recall. He died March 16, 1807.

Parker, Joseph (1830-1902). British divine. The son of a stonemason, he was born at Hexham,



Joseph Parker,
British divine

April 9, 1830. In 1852 he entered the Congregational ministry. After being in London at Moorfields for a short time, he went in 1853 to Banbury, and in 1858 to Manchester. In 1869 the independent church in the Poultry, London, invited him to become its minister, and while there he secured the erection of the City Temple, Hol-

born Viaduct, opened in 1874. Here Parker was one of the most popular preachers of the day. He died Nov. 28, 1902. He published a large number of books, including *The People's Bible*, 25 vols., 1885-95; and *The Paraclete*, 1874. *Consult* *My Life and Teaching*, J. Parker, 1889; *A Preacher's Life*, J. Parker, 1899.

Parker, Louis Napoleon (1852-1944). British dramatist and pageant-master. The son of an American father and English mother, he was born in Calvados, France, Oct. 21, 1852. After studying at the Royal Academy of Music, he became director of music at Sherborne school, 1873-92. The pageant which he organized at Sherborne in 1905 was followed by other equally successful spectacles, e.g. *Warwick*, 1906; *Bury St. Edmunds*, 1907; *Dover*, 1908; *Colchester and York*, 1909. As a dramatist he achieved fame with *Drake*, produced at His Majesty's 1912. A skilful adapter and translator, he prepared for the English stage *Beauty and the Barge* (from *The Lady of the Barge*, by W. W. Jacobs), *David Copperfield*, *Rosmersholm*, and *L'Aiglon*. He died Sept. 21, 1944.

Parker, Matthew (1504-75). English prelate. Born at Norwich, Aug. 6, 1504, the son of a cloth presser, he was educated at Corpus Christi College, Cambridge, where he associated with Latimer and other reformers. Ordained in 1527, he became chaplain to Anne Boleyn in 1535, and in 1537 to Henry VIII. In 1544 he was appointed master of his college, and was twice elected vice-chancellor of Cambridge university. He married the daughter of Robert Harlestone, an ardent reformer, in 1546, supported Northumberland against Mary, was in danger of his life throughout her reign, and had to remain in concealment. Elizabeth on her accession in 1558 made him archbishop of Canterbury. Parker took a leading part in translating and publishing the Bishop's Bible, 1563-68, made a collection of literary treasures, and presented priceless MSS. to Corpus Christi library. He opposed Puritanism with moderate success. He died May 17, 1575.



Matthew Parker,
English prelate

Parker, Sir Peter (1721-1811). British sailor. Born in Ireland, son of Rear-Admiral Christopher

Parker (d. 1765), he went to sea young, and after serving in the W. Indies saw action at Toulon, 1744. In 1759, commanding the Bristol, he assisted in the reduction of Guadeloupe, and in 1761 of Belle-Île. He was given command of a squadron and sent to N. America, 1775. Disastrous failure to force the entrance to Charleston Harbour cast him under a cloud, but in 1777 he was made commander-in-chief of Jamaica. In 1782 he returned to England, and was made a baronet. He died Dec. 21, 1811.

Parker Dam. Dam across the Colorado river, U.S.A. Situated below Boulder, it diverts the river water into the Colorado aqueduct for Los Angeles. Completed in 1938, the Parker Dam is of concrete and has a maximum height of 320 ft., maximum width 800 ft. It is unique in having 235 ft. of its height below the river bed.

Parkersburg. City of West Virginia, U.S.A., the co. seat of Wood co. It stands at the confluence of the Little Kanawha and Ohio rivers, 65 m. N. of Charleston, and is served by the Baltimore and Ohio and other rlys., steamers, and airport. In the Ohio, 2 m. below the city, is Blennerhassett Island, associated with Aaron Burr's abortive conspiracy to establish an "empire" in the south-west. There are gas and oil wells, farms, and mineral springs in the district, coal and clay being produced. Industrial establishments include foundries, oil refineries, lumber and flour mills, rly. shops, and manufactures of iron and steel, clothing, and porcelain. Settled 1773, incorporated 1820, Parkersburg became a city 1863. Pop. 30,103.

Parkes. Town of New South Wales, Australia, in Ashburnham co. It is 300 m. by rly. W.N.W. of Sydney, and is a centre of fruit and wheat growing and gold mining. Pop. 6,800.

Parkes, Sir Harry Smith (1828-85). A British diplomatist, born Feb. 24, 1828. He was the son of a Walsall ironmaster, and went to King Edward's grammar school, Birmingham. As a boy of 13 he went out to China and a year later became an official interpreter. He was one of the principal agents in negotiating a treaty with Siam in 1855. After the capture of Canton by the British in 1857 Parkes was one of three commissioners placed in charge, and though the Chinese set a price on his head he not only kept order in the city, but also explored a large hostile district. After the Peiho

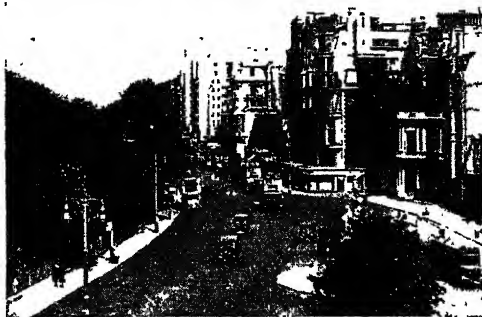
disaster, 1859, he secured Kowloon and Chusan as army bases, and took part in the Peking campaign. His party was treacherously arrested under a flag of truce and tortured, but Parkes was eventually released and was present at the capture of Peking. Knighted in 1862 and appointed minister to Japan in 1865, he succeeded in enforcing the ratification of the 1858 treaty, and remained there 18 years except for periods of leave. Transferred to China, he died there March 22, 1885.

Parkes, Sir Henry (1815-96). Australian statesman. Born at Stoneleigh, Warwickshire, May 27, 1815, he emigrated to Australia at 24 and settled in Sydney. Entering political journalism, he started *The Empire* newspaper, 1849, and agitated strongly against the importation of convicts and in favour of colonial self-government. Member of the legislative council in 1858, he was colonial secretary 1866-68, and in 1872 became prime minister on the free imports platform. Defeated in 1875, he returned to office for a few months in 1877, in which year he was knighted. He was prime minister again 1878-83 and 1887-91. A consistent advocate of free trade, he was also the principal author of Australian federation. He died April 27, 1896. *Consult* Life and Work, T. Bavin, 1941.

Parkhurst. An English convict establishment. Situated about 1 m. N. of Newport, Isle of Wight, it consists of two separate prisons. It accommodates ordinary convicts serving sentences of over 3 years and men under sentence of preventive detention. Convicts requiring hospital treatment are usually sent there.

Park Lane. London, thoroughfare. It runs N.W. from Piccadilly to Marble Arch and marks the W. boundary of Mayfair. At its junction with Hamilton Place a "poets'" fountain by Thornycroft was erected in 1875 and demolished in 1949. From here Hyde Park is on its W. side. A lane leading from semi-rural Piccadilly to Tyburn at the beginning of the 18th century, Park Lane became a fashionable place of residence; during the 19th and early 20th

centuries palatial mansions were erected, notably Londonderry House, 1850; Dorchester House, 1851-53; Dudley House, Brook House, Aldford House, and Stanhope House. At No. 29 Disraeli lived 1839-72. Before the First Great War its character was plutocratic rather than aristocratic. Grosvenor House and Dorchester House were later demolished and replaced by hotels, flats, and shops.



Park Lane, London. Looking N.W. along this noted Mayfair thoroughfare, with Hyde Park on the left

During the Second Great War German bombs wrecked a number of the bow-fronted houses that faced Hyde Park.

Parkman, Francis (1823-93). American historian. Born at Boston, Sept. 16, 1823, he passed most of his youth in roaming about the woods, and had visited Italy before he took his degree at Harvard in 1844. The idea of writing the story of America's past gripped him early, and to study primitive life he spent some time in the wild west, learning much about the Indians. Despite an affection of the eyes which obliged him to live in a darkened room, he produced classic books: *The Conspiracy of Pontiac*, 1851; *England and France in the New World*, published in sections, each with a separate title, 1865-92. Parkman died Nov. 8, 1893. *Consult* Journals, ed. M. Loade, 2 vols., 1949; *Lives*, C. H. Farnham, 1901; H. D. Sedgwick, 1904.

Park Royal. Dist. of Middlesex, England. It has Willesden to E.N.E. and Ealing to S.W., and is well served by rly. and bus, Western Avenue running through it. The district was laid out as a permanent showground of the Royal Agricultural Society of England, but after 1905 the estate was split up into building sites. Here are Guinness's London brewery and other industrial works.

Parkstone. District of Dorset, England, forming a N.E. suburb of Poole. Lying between that town

and Bournemouth, it has a rly. station. Owing to the fine woods around it and other attractions, it is much visited during summer. Pop. 11,618.

Parlement. Former French court of justice. The name is identical with that of parliament, although now used in a different sense. It was first given, as in England, to a meeting for discussion, but soon the parlement of France developed into a court of justice, not a legislative assembly.

The early French kings heard disputes in person; in this work they were assisted by their vassals, and about the time of St. Louis this *curia regis* became definitely a court of law, not unlike the English court of exchequer. It sat permanently in Paris, and was therefore called the parlement of Paris; its active members became a class of regular professional judges, both clergy and laymen; the king ceased to preside over its sessions, giving way to a president. It was the court to which came cases about the royal estates, and appeals from the decisions of the king's baillis and seneschals. This process was completed before 1500, but soon the business of the parlement had increased so much that it was divided into several sections. It was also a court of which theoretically all the peers of France were members.

On this model, parlements were established in the provinces; at the Revolution they existed at

Rouen, Rennes, Grenoble, Dijon, Bordeaux, Nancy, Besançon, Toulouse, and elsewhere. These were courts of appeal for the various provinces, having each a retinue of lawyers, including a president, councillors, and permanent officials of lower rank. The offices passed from father to son, or were sold openly to the highest bidder. A

parlement could make regulations for the government of the province, and before coming into force all laws were registered by it. The parlements were most powerful during the 18th century, when they were the only remaining check on the royal authority. They were abolished at the time of the Revolution, and never revived.

PARLIAMENT: HISTORY & PROCEDURE

A. F. Pollard, M.A., former Prof. of History, London Univ.

In addition to this historical sketch, which concludes with a section on parliamentary procedure, there are articles on Commons, House of Lords, House of Commons, Division; King's Speech, etc.; also Government; Politics; Representation; Vote

Parliament originally meant a parley, and nothing more. The word is found in French early in the 12th century, and its use became common in England during the 13th, to denote any kind of conference. Its official use was restricted to specially full meetings of the king's council summoned four times a year, i.e. in every legal term, to consider public affairs and particularly legal cases which were especially difficult or required a novel remedy. To official gatherings of this kind the word was long restricted in both France and Scotland, and even in England a "parliament of the council" was described as a full parliament in the 14th century, even though no specially summoned peers were present, and no generally summoned representatives of the

commons. The really original work of Edward I, which was ultimately to distinguish the constitutional system of England from those of France and Scotland, was that, instead of keeping these parliaments of the council separate from the representative estates, he joined the latter to the former, and thus formed the Parliament which is at once a "high court"—indeed, the highest law court in the land—and also a popularly elected legislative and taxing body.

In both its aspects Parliament developed out of feudal ideas and conditions. Representation, unknown to the classical world, had been familiar in Anglo-Saxon times since the days when the reeve and four "best" men of the town began to attend the shire-moot. But the "best" men were the



Parliament. The Houses of Parliament, seat of British legislature, on the banks of the Thames, at Westminster, London. On the extreme left are the towers of Westminster Abbey, next are the Victoria Tower and Central Tower, and on the right the Clock Tower containing Big Ben

possessors of the best tenements, and the obligation of attendance was often attached as a duty to the particular holding. After the Norman Conquest the rule was that if the lord or his steward chose to attend, his attendance excused the rest of the community; but if neither proposed to attend, then the township must send its reeve and four best men. The obligation lay on each community as a whole, and the boon of representation consisted not in the fact that the few had to attend, but in the fact that all the rest were thus enabled to stay at home. The same principle was extended from the shire-courts to the king's high court at Westminster. The greatest tenants-in-chief, whether bishops or barons, were required to come by individual writs of summons; they enjoyed no representation. But the lesser tenants-in-chief and the cities and boroughs were excused on condition of producing two representatives of each shire, city, and borough, to do their duty for them; and the lower clergy were offered the same advantage.

The business of these representatives was judicial and financial; politics could only come later when the people had acquired some political knowledge and capacity. Work of this kind had long been done on the representative principle in the shire-courts, and the summons to Westminster was due to the increasing superiority of the justice administered in the king's court to that which was administered in the local popular or feudal courts. Henry II had created a highly expert *curia regis*, with which no other court could compete, either in respect of competence or of power; and in spite of the reactionary attempts of the barons to limit by means of Magna Carta the jurisdiction of the king's court, it developed rapidly during the reign of Henry III.

Hearing of Pleas

New writs were devised to remedy abuses; no court could use them but the king's, and this meant that an increasing number of suitors were continually being attracted to Westminster Hall, where three committees of the king's court, common pleas, exchequer, and king's bench, were gradually formed to deal with their petitions. A parliament was properly a joint session of these committees, with the non-judicial members of the council, and its preliminary was a proclamation that all who had petitions to present should present them by a certain date; receivers and triers of petitions were then appointed, and the pleas were

heard. A further advantage of a parliament was that no fees were charged for a petition.

Parliaments of this sort were held before the business of representation was organized by means of the writs to the sheriffs and the regular return of elected representatives from the shires and boroughs; and agents of the shires and boroughs had often presented their legal business at Westminster. Simon de Montfort's parliament of 1265 was an extension and application of this kind of assembly to the political purpose of placing the royal authority in commission. Its defect was that it consisted solely of his partisans, and there is little evidence that this gathering had either the means or the will to perform the legal functions which long continued to be the principal business of parliament. The regularisation of this legal business was largely due to financial reasons. So long as land was the only source of direct taxation, only the chief landholders had been consulted.

Taxation and Representation

But as the financial necessities of government increased, the basis of taxation was extended to personal property and to a larger section of the community; and taxation became the mother of representation. At first the king sent his agents round to the shires and boroughs to negotiate locally for grants; but it was soon found more expeditious and profitable to summon agents of the localities to make their grants in the king's presence at Westminster. Thus representatives were summoned to attend the parliaments of the council (a) to make grants of taxation and (b) to present petitions for legal redress. They were not asked to legislate. What legislation there was took the form of ordinances in council, devised by the judges and enacted by the crown, and Edward I himself enacted most of his legislation before he summoned his model parliament of 1295.

These parliaments were held in a single chamber, at the upper end of which sat the king on his throne. At his feet sat the chancellor on one of the four woolsocks, arranged in a square on which sat the council, the judges of the king's bench on the chancellor's right, and the judges of common pleas on his left: opposite the chancellor sat the masters in chancery. The council was the original core of parliament, and all the other elements were accretions. Outside this inner square of councillors the bishops and abbots sat on benches running down from the right of the

throne, and the earls and barons on its left. At the lower end of the chamber beyond the bar stood the Commons with the Speaker at their head, on the rare and solemn occasions on which they appeared in parliament.

The business was opened by the chancellor or some other councillor, who explained the cause of summons and the royal needs; and the various estates (the notion that there were only three is a misleading fiction) separated to deliberate on the answers they should make. The lower clergy withdrew to their own convocation, and in the 14th century ceased altogether to come to parliament. The knights of the shires and burgesses at first withdrew to separate rooms, but before the middle of the 14th century coalesced to deliberate, first in the refectory, and then in the chapter house of the Abbey across the way. The specially summoned prelates, earls, and barons asserted, probably in Edward II's reign, a claim to remain in the parliament chamber with the king's council, thus making it a *magnum concilium*, and the parliament chamber was thus also known as *camera magni concilii*.

As soon as the various estates had agreed upon their answers they returned into the parliament chamber to report them, the Commons by the mouth of their Speaker, and the clergy by their prolocutor; and the business of the representatives was at an end. They might stay on to hear the result of their petitions, but did not do so in any numbers until their individual petitions had been converted into effective or common petitions and made the basis of legislation. In any case the council continued sitting in parliament to deal with parliamentary petitions long after all the other elements had gone home. Most of the petitions presented were, however, at once referred to the appropriate courts; and it was only with the residue, which on account of their special difficulty or the novelty of the remedy required could not be so referred, that the council dealt in parliament.

Formation of Two Houses

Parliament was thus in the 14th century a single chamber for its solemn business, and broke up into a variety of meetings for what might be called committee-business. The two "Houses," so familiar to-day, were formed not so much by the division of parliament as by the amalgamation of various "estates." The prelates, earls, and barons clung to, and gradually

swamped, the council, the lower clergy went off to convocation; and the knights of the shire and burgesses united to form the house of commons. In time the separate work of these two groups, lords and commons, grew more important than their joint work in common session.

More unfortunate from the point of view of understanding the origin and history of parliament has been the removal of the law courts from Westminster Hall to the Strand, and the consequent severance in the public mind of what was originally a single institution.

Change in Functions

The kernel of this change was the conversion of individual petitions, which are matters for judicial redress, into the common petition, which requires legislation and political action, and this development, which, more than anything else, created the house of commons, also determined the functions of parliament. Parliamentary petitions were more and more referred to the council and by the council to chancery, the star chamber, and others of its departments; and with the loss of this business parliaments grew more infrequent towards the close of the Middle Ages. Attendance was shirked both by lords and commons, and it was not until the growth of political intelligence followed on the Renaissance, localism expanded into nationalism, and the Tudors were compelled by their break with the Church to rely on parliament, that the ebbing tide of parliamentary activity was turned into its broader modern channels.

It was nursed by Henry VIII, grew fractious under Elizabeth, and rebelled against the Stuarts. That war against the Stuarts was the best testimony to the fostering care of the Tudors, for no parliament in the Middle Ages could ever have waged a war against the crown. But under Henry VIII a parliament, instead of being a matter of two or three weeks, sat for seven years, and during such periods acquired a solidarity, a self-knowledge, a tradition, a body of rules and customs, and a mastery of politics such as it had never possessed before. The Rolls of Parliament kept by the crown are superseded by the Journals kept by the Houses themselves; Henry VIII's habit of doing everything by parliament created the impression that nothing could be done without parliament; and it developed a will of its own,

denying the crown all sorts of control it had exerted before and eventually establishing its claim to be the superior power. The Revolution of 1688 asserted the responsibility of the executive to parliament, but not until 1832 was the responsibility of parliament to the people fully recognized, and that recognition led to the supremacy of the house of commons, which was established by the Parliament Act of 1911.

Parliament is now legally the sovereign body in the constitution, though politically it obeys the will of the constituencies, and is sometimes threatened with the unconstitutional alternative of "direct action." It makes and unmakes laws, retains or turns out ministries, and directly or indirectly controls the whole of British policy. Unlike most modern legislatures, and particularly that of the United States, it is bound by no written constitution and hampered by no "separation of powers."

Scope of Powers

It can alter the most fundamental law with the same expedition and machinery as it passes or repeals a tramway Act; and no fixed terms of office, either for legislature or executive, prohibit the solution of disputes between them by a dissolution of the legislature or an ejection of the executive. On the other hand the elasticity of the system subjects parliament to manipulation; it can be dissolved at a psychological moment, and can then prolong its own existence long after the popular mood has passed. The English parliament has been imitated in every quarter of the globe.

A. F. Pollard
Bibliography. Parliament: its History, Constitution, and Practice, Sir C. P. Ilbert, 1911; The Evolution of Parliament, A. F. Pollard, 1920; What Parliament Is and Does, Lord Hemmingford, 1927.

PARLIAMENTARY PROCEDURE. The term "parliamentary procedure" in the British parliament is often restricted to the internal procedure which each house is free to regulate for itself; but it also covers properly the relations between the two houses and between them and the crown. It has developed over 600 years and is still constantly changing. It consists of a mass of time-honoured rules and conventions, supplemented by modern standing orders.

When a new parliament meets the commons are directed to elect a speaker, who is their impartial president and the guardian of procedure. He calls members

who wish to speak, puts the necessary questions, and announces the decisions of the house; but he takes no part in debates and has only a casting vote. He enforces the rules of order and has powers to select amendments and to accept or refuse the closure.

The government benches are on the speaker's right, those of the opposition on his left. All members are deemed equal in the house. They must address the chair and may not use "unparliamentary" language.

Every matter to be decided is put in the form of a question, capable of being voted upon, aye or no, and the decision of the majority is accepted as that of the house. The quorum is 40.

Standing orders provide the hours of sittings, but these hours may vary, either because the house has agreed to suspend these rules or because it is considering certain business which is specially exempted from the rules.

Questions to ministers occupy the first hour of every day (except Fridays) after prayers. The remaining time is divided between "notices of motions," or fresh propositions, and "orders of the day," which are items ordered by the house, to be considered, including the stages of bills, financial business, and adjourned debates.

A bill may originate in either house and is given a formal first reading. Its principle is decided upon second reading and its details thrashed out during the committee and the consideration (or report) stages. After a final debate on third reading, the process is repeated in the other house. Failing agreement between the two houses, the bill is lost; but if agreement is reached, the bill receives the royal assent in the house of lords and becomes an Act of Parliament.

All taxing and spending proposals, being of special importance, require extra stages. Thus, the budget resolutions originate in committee of ways and means, the estimates for the fighting and civil services occupy about 26 "allotted days" in committee of supply, and projects for fresh spending start in other committees of the whole house. They must all be agreed to by the house itself and then incorporated in legislation, the finance bill, the appropriation bill, and other bills. Proposals for fresh spending can be initiated only by the crown, by means of the king's recommendation signified by a minister.

Much business is devolved upon standing committees of about 50 members which are microcosms of the house and which consider the committee stages of bills; and upon smaller select committees, e.g. the committee of privileges, the committee of selection, and the public accounts committee.

Procedure in the house of lords differs mainly in detail. The quorum is 3. The lord chancellor, who acts as speaker, has no powers of authority, but he is a member of the government and takes part in debate. No financial measure may originate in the lords. There are no committees of supply or ways and means, and no standing committees.

S. Gordon

Bibliography. Parliamentary Procedure, T. Erskine May, 14th ed., 1946; The House of Commons, R. Palgrave, 1878; Procedure of the House of Commons, J. Redlich, 3 vols., 1908; The Pageant of Parliament, 2 vols., 1921; Manual of Procedure in the Public Business of the House of Commons, 7th ed., 1942.

Parliament, Houses or. Seat of the U.K. legislature at Westminster. The building in which the commons and the lords meet forms, together with Westminster Hall, a single pile. Erected in Yorkshire sandstone (which proved to weather badly in London's atmosphere) from Sir Charles Barry's designs to replace an edifice destroyed by fire in 1834, it was begun 1836 and completed 1857, although in use before that. In Late Gothic style, the present building covers 8 acres, and contains 11 courts, 100 staircases, and 1,100 apartments, principally the chambers of the house of commons and house of lords, those for use of the sovereign on ceremonial occasions, the royal court, and royal gallery. Westminster Hall, part of the ancient palace, escaped the fire of 1834, and forms a vestibule to the houses of parliament.

Other features include the clock tower (containing Big Ben, *q.v.*) at the N. end, 318 ft. high; the central tower, 300 ft.; and Victoria Tower, 340 ft. While parliament is sitting a Union flag flies from Victoria Tower by day, a light is shown in the clock tower by night. The imposing river front, with its terrace facing the Thames, is 940 ft. long, and adorned with statues of English monarchs. Twelve times the houses of Parliament were hit by bombs during the Second Great War, the chamber of the house of commons being destroyed on May 10, 1941. Frescoes painted

for the halls and galleries include Madise's huge Death of Nelson and Meeting of Wellington and Blucher; Copley's Death of Chatham; Cope's series depicting events of the Stuart period; another series by various artists depicting the Tudor period; and a series relating to the building of Britain by Glyn Philpot, Charles

Sims, A. K. Lawrence, Sir W. Rothenstein, and others. See Commons, House of; Lords, House of; Westminster Hall.

Parliament Act. Statute enacted Aug. 18, 1911, limiting the power of the house of lords. A controversy had arisen between lords and commons as a result of the rejection by the lords of the Liberal gov't's budget of 1909. After two general elections in 1910, Parliament bill was passed in the commons and ultimately in the lords after an announcement by H. H. Asquith, the prime minister, that the king would, if necessary, use his prerogative of creating enough new peers to secure the passage of the bill.

The Act limited the power of the lords to delay a money bill to one month, and provided that if any other bill were passed by the commons in three successive sessions it would become law at the end of that time even if not passed by the lords. But two years had to elapse between its second reading in the commons on its first introduction and its final acceptance by that house. A further Parliament Act, passed by the commons in three successive sessions in 1947-49, reduced this period to one year.

The Act of 1911 had referred in its preamble to the necessity for reforming the house of lords, and various proposals for reform were put forward, notably by a committee under Lord Bryce in 1917-18. In 1947-48 an inter-party conference was held to consider reform, but this broke down in May, 1948, following impossibility of agreement on the length of the suspensory period. See Lords, House of.

Parliamentary Agent. Person, usually a solicitor by profession, and acquainted with the details



Parliament Square, Westminster. View from the W. side looking towards the Houses of Parliament. The statue in the bottom left corner is that of Lincoln. See page 6349

of parliamentary procedure, employed to assist the promoters of private bills by canvassing members of parliament, securing information, and facilitating the drafting and passing of bills.

Parliamentary Train. Type of railway service formerly operated in the U.K. When the first railways were granted concessions to build their tracks, they were obliged by Act of Parliament to reserve a proportion of accommodation on the trains for 3rd-class passengers at the rate of 1d. a mile. The companies met this obligation by running a number of trains of this kind every day. Parliamentary trains were generally slow and uncomfortable, and were gradually withdrawn as higher fares were allowed, and 3rd-class accommodation was provided on ordinary trains. The last ran in 1912.

Parliament Hill and Fields. London open space. Situated near the Hampstead border of St. Pancras, the hill is 319 ft. in height, and has a chain of ponds, over one of which the roadway is carried by a viaduct. Since 1889 the hill and fields, covering 267 acres, have formed an integral part of Hampstead Heath, being acquired for the public at a cost of £301,000.

The name Parliament Hill is supposed to connect the spot with an ancient folk-moot, or with the planting of cannon here by the Parliamentary forces for the defence of London during the Civil War. Its alternative name of Traitors' Hill is associated with the legend that here the confederates of Guy Fawkes assembled to witness the blowing up of the houses of parliament. The tumulus popularly known as Boadicea's Tomb was explored in 1894, when it yielded the rival theories that

it was an ancient burial mound of the early bronze period, or that it was originally raised as a Roman boundary mark.

Parliament Square. Square and open space in the city of Westminster. Facing New Palace Yard, it is overlooked by Westminster Abbey, the houses of parliament, and Middlesex Guildhall. Until the early 19th cent. the site was covered by narrow streets and mean houses; when the houses of parliament were completed, the present lawns were laid. In the square are statues of the prime ministers Canning, Peel, Palmerston, Derby, and Beaconsfield, and of President Lincoln. The roads bounding the square form a traffic "roundabout." Parliament Street leads out on the N. side. Work was undertaken in 1950 to widen the square and make new lawns, to link it with the Abbey sanctuary. See illus. p. 6348.

Parma. Prov. of N. Italy, in Emilia. It is bounded N. by Cremona, S. by Massa e Carrara and Genoa, E. by Ferrara, and W. by Piacenza. Mountainous in the S., it slopes in a N.E. direction from the Ligurian Apennines to the river Po, which forms its N. boundary. The Parma, Baganza, and Taro, all tributaries of the Po, are the chief rivers watering the province. Cereals, wine, oil, cheese, and fruit are produced. Cattle rearing and silk manufacture are important industries. There are many mineral springs, the most famous being that at Salsomaggiore. The capital is Parma (*v.i.*). Area, 1,258 sq. m.

Parma. City of Italy, capital of the prov. of Parma. It stands on both banks of the river Parma, 75 m. by rly. S.E. of Milan. An ancient and handsome city, surrounded in part by ramparts, its streets are straight and wide, while

the old Aemilian Way traverses the city from E. to W. Its Lombard-Romanesque cathedral, built about 1059-1106, with later additions, has a lofty campanile and an octagonal dome, containing a fresco of the Assumption, one of Correggio's greatest works. The Romanesque baptistery, with a Gothic upper storey, 1196-1302, built of marble, is one of the finest in Italy.

There are about 60 other churches, some of which were damaged by bombing during the Second Great War. The most notable, which received only superficial damage, are three Renaissance churches, Our Lady, 1521-39, S. John the Evangelist, 1510-1614, with frescoes in the dome by Correggio, and the Annunciation, 1566-1632. The ducal palace, or Palazzo della Pilotta, had art galleries with paintings by Correggio and other masters, a library containing over 300,000 volumes and 4,500 MSS.; and a museum of antiquities: but was extensively damaged during the Second Great War. The university dates from 1482. The convent of San Paolo contains the celebrated Putti of Correggio. The chief industries of the city are connected with printing, silk, cereals, dairy produce, wine, and cattle.

Probably of Etruscan origin, Parma was colonised by Rome, 183 B.C., and the Roman bridge over the Parma is still extant. Its bishopric is first mentioned A.D. 378. In 1346 Parma was sold by the Correggio family to that of Visconti, and was associated under the Sforzas with the duchy of Milan until 1511. On June 29, 1734, the Austrians were defeated here by the French and Sardinians. Pop. 72,000.

During the Second Great War Parma was lightly damaged except near the rly. station. The city was captured from the Germans by the 5th Army on April 25, 1945, with no opposition worthy of mention being encountered.

Parma, DUCHY or. Former independent state of Italy. Adherent to the Guelph faction during the Middle Ages, the city and its territories passed through many hands before they

were absorbed in the papal possessions in 1512. In 1541 Pope Paul III made his son, Pier Luigi Farnese, duke of Parma and Piacenza, and his descendants held the title until 1731, when, with the death of Antonio, 8th and last Farnese duke, the duchy became an apanage of the Spanish crown. It was transferred to Austria in 1734, but reverted to Spain in 1748. In 1796 the French Revolutionary armies occupied it for six years, when Napoleon included it in the kingdom of Etruria, 1802.

The congress of Vienna, 1815, welded Parma, Piacenza, and Guastalla into a grand duchy of Parma, in which Napoleon's widow, Marie Louise, was given a life interest. On her death, 1847, this duchy passed to Charles Louis, son of the last Spanish duke. Charles Louis, a mere tool of Austria and governed by Tom Ward, the English stable-lad whom he had made prime minister, fled at the revolution of 1848, and the following year abdicated in favour of his son, Charles III, who was assassinated in 1853. He was succeeded by his son Robert, who was deposed in 1860, when the grand duchy became part of the kingdom of Italy. See Farnese; Italy.

Parma, ALESSANDRO FARNESE, 3RD DUKE OF (1545-92). Italian soldier and statesman. Born in Rome, Aug. 27, 1545, Alessandro was the son of Ottavio Farnese (1520-86) and Margaret, natural daughter of the emperor Charles V, and spent his early years at Brussels and Madrid. Under Don John of Austria he showed conspicuous courage at Lepanto, 1571, and was dispatched to aid his struggle to maintain Spanish supremacy in the Netherlands, 1577. He succeeded Don John as governor-general in 1578, and by astute diplomacy and skilful generalship succeeded in recovering the Walloon dependencies, his chief exploit being the 14 months' siege of Antwerp, 1584-5. He succeeded in saving Paris from capture by Henry IV, 1590, and Rouen from the Huguenots, 1591, but died at Arras on Dec. 3, 1592. See Farnese.

Parmenides (c. 540-460 B.C.). Greek philosopher. A native of Elea, he was the chief representative of the Eleatic school of philosophy, founded by Xenophanes. Whereas Heraclitus had taught that everything was in a state of flux or movement, and that permanence was an illusion of the senses, Parmenides taught the opposite doctrine. All movement



Parma, Italy. Cathedral and 13th century campanile, from the south-east

and change, he said, were illusions, and all things have existed, and will exist, the same for ever.

Parmenio (d. 330 B.C.). Macedonian soldier. He was second in command to Alexander the Great on his Persian campaigns, leading the left wing in the three battles of the Granicus, Issus, and Gaugamela. Subsequently he became involved in a plot organized by his son against Alexander, and was put to death.

Parmesan Cheese. Product of two districts of Italy, Parma and Emilia. It is so hard that it is used only for cookery, in grated form. It is made from heated cow's milk, into which rennet is dropped in bags and then removed. The curd is broken up, heated again, pressed between boards, and left in a mould for two or three years. The crust is then nearly black, the cheese very pale, and covered with tiny holes.

Parmigiano (1504-40). Italian painter. His name was Girolamo Francesco Maria Mazzola, and he was born Jan. 11, 1504, at Parma, whence he was commonly called *Il Parmigiano*. The son and nephew of painters, he was largely self-taught, but his early work was influenced by Correggio, and his later by Raphael. His chief paintings include frescoes at Parma and in Rome, and a famous altar-piece at Bologna. Parmigiano was one of the first Italians to practise etching. He died at Casal Maggiore, Aug. 24, 1540.

Farmoor, CHARLES ALFRED CRIPPS, 1ST BARON (1852-1941). British politician. Born Oct. 3,



1st Baron Farmoor,
British lawyer
Russell

1852, he was educated at Winchester and New College, Oxford, where he took four firsts. He was called to the bar in 1877, took silk in 1890, and became attorney-general to the prince of Wales in 1895, being reappointed in 1901 and 1912. He was Unionist M.P. from 1895 to 1914, with intervals, for various divisions, then becoming a baron. An authority on ecclesiastical law, he was chancellor and vicar-general of York, 1900, and vicar-general of Canterbury, 1902-24. During the First Great War he championed the conscientious objectors, and later became an enthusiastic supporter of the League of Nations. Embracing the cause of Labour, he was lord president of

the council in Ramsay MacDonald's 1924 cabinet, holding the same office from 1929 to 1931, when he resigned on the formation of the National government. In 1939 he finally broke with the Labour party. He was made a privy councillor in 1914. His *Principles of the Law of Compensation*, 1881, is a standard work. He also published *A Retrospect*, 1936. He died June 30, 1941. His second son was Sir Stafford Cripps (*q.v.*).

Parnahyba. Town and river of Brazil. The former, in the state of Piahy (Piaui), stands on the river Parnahyba, 11 m. from its mouth. An important river port, it exports cattle, hides, tobacco, cotton, etc. Pop. 15,000.

The river rises in the Serra das Mangabeiras, and flows N.N.E., forming the boundary of the states of Piahy and Maranhão. After a course of about 800 m., 400 m. of which are navigable by small steamers, it discharges into the Atlantic by a delta.

Parnassiens. Group of French poets of the later 19th century. The name is derived from *Le Parnasse Contemporain*, a collection of poems by many authors published in 1866. Among the contributors were the older poets Leconte de Lisle, Théophile Gautier, Théodore de Banville, and Charles Baudelaire. Other collections under the same title appeared in 1869 and 1876. An offshoot of Romanticism, the school, which was mainly lyrical, eschewed all appeals but the aesthetic. Falling into preciosity and artificiality, they were succeeded by the Symbolists (*q.v.*).

Parnassus. Mountain of Greece. It is the highest peak, 8,069 ft. alt., of a range in Phocis, ancient Greece, lying N. of Delphi. Parnassus was sacred to Apollo and the Muses, and also of Dionysus. Immediately above Delphi is the celebrated Castalian spring.

Parnell, CHARLES STEWART (1846-91). Irish nationalist. He was born at Avondale, co. Wicklow, June 27, 1846, of an English family long settled as landowners in Ireland, and was educated at Magdalen College, Cambridge. In 1875 he entered parliament as a Home Ruler.

Though a landlord, a Protestant, and a man reserved and aloof in manner, he exercised a commanding influence which transformed his party, small as it was, into an instrument which came near to paralysing the house of commons; a disciplined body which devoted itself to such an organized obstruction of public

business as hitherto had never been known in England.

Parnell's aim was explicitly the establishment of an independent parliament in Dublin. For the



Charles S. Parnell,
Irish Nationalist

agrarian question, the grievance consciously felt by the Irish peasant, he avowedly cared little, but he saw in it the means of combining the great majority of the Irish people into one compact force. To that end in 1878 he organized the Land League, poured vitriolic scorn on every English attempt to provide remedial agrarian legislation, and urged the Irish peasantry to adopt every conceivable method short of positive crime to render the law nugatory. The Phoenix Park murders in 1882 forced him to an open denunciation of such crimes, and a contemptuous repudiation of charges that he had condoned them.

Popular opinion, however, still held Parnell guilty, morally at least, of Irish crimes and outrages, until a special judicial commission was appointed to investigate the whole question of "Parnellism and crime." The sensational event of this inquiry was the demonstration that an alleged letter of Parnell's, utterly damning if genuine, was a forgery by Richard Pigott, which The Times newspaper had accepted with reckless credulity. Liberals and Irish Home Rulers were drawing into a close alliance, when Parnell was disastrously implicated in a divorce scandal. His intimate and trusted agent, Captain O'Shea, cited him as co-respondent in an action for divorce which he instituted against his wife, and, the action being undefended, secured a decree in Nov., 1890.

Parnell's retirement from the leadership was demanded by Gladstone; the Irish party was divided, the great majority insisting upon Parnell's withdrawal. Parnell fought fiercely for his position, repudiating the Liberal alliance. But before it could be said that the fight was decided, he died suddenly on Oct. 6, 1891, within four months of his marriage to Mrs. O'Shea. Had he lived, his help would probably have enabled Gladstone to carry the Home Rule proposal in 1892. He was at once a driving and a restraining force, and without him Irish nationalism

was tactically leaderless. See Home Rule; Ireland.

Bibliography. Lives. R. B. O'Brien, 1898; Mrs. C. S. Parnell, 1914; St. J. Ervine, 1925; The Parnellite Movement, T. P. O'Connor, 1889; P., The Last Five Years, A. F. Robbins; P. Vindicated, H. Harrison, 1931. A play, Parnell, by Elsie Schaffer, was shown in London, 1936.

Parnell, THOMAS (1679-1718). British poet. Of English descent, he was born in Dublin and educated at Trinity College.



Thomas Parnell, English poet

Made a minor canon of S. Patrick's cathedral, 1704, he was archdeacon of Clogher, 1706-16, and then became vicar of Finglas. Visiting England in 1706, he was

on terms of friendship with Harley, Swift, and Pope. He contributed to The Spectator and The Guardian; was one of the Scriblerus Club; and aided Pope in his translation of the Iliad, for which he wrote the introductory essay on Homer. On the death of his wife (Anne Minchin) in 1711, Parnell gave way to intemperance, and, dying at Chester, was buried in Trinity church there, Oct. 24, 1718. Praised by Goldsmith, who wrote his Life, and by Campbell, his work is marked by love of the classics, humorous fancy, grace, good taste, and moral feeling, and serves as a link between that of Pope and Goldsmith. Especially notable are his Hymn to Contentment, A Night-piece on Death, Epistle to Pope, A Fairy Tale, and The Hermit. Pope edited Parnell's Poems, 1721, and G. A. Aitken his Collected Works, 1894.

Parody. Imitation, mainly as manifested in literature, of the general style or spirit of a writer or of the form of a specific piece of work, with intent to make fun. It differs from burlesque, which is a laughable perversion of a serious theme, in that it is a mocking of the manner rather than the matter. In Sir Owen Seaman's words, "At its lowest a mere verbal echo, at its highest it becomes a department of criticism."

Though the art is an old one, exemplified first in The Battle of the Frogs and Mice, and merging in the hands of Aristophanes through burlesque into pure comedy, modern parody may be said to begin with The Pipe of

Tobacco of Isaac Hawkins Browne, 1736, little known now except by students. Popular parody started in England with The Anti-Jacobin of Canning and Frere, 1797, and The Rejected Addresses by James and Horace Smith, 1812. Some of the chief British parodists are Thackeray, Sir Theodore Martin, W. E. Aytoun, C. S. Calverley, Quiller-Couch, Seaman, Sir John Squire, and Sir Max Beerbohm.

Parole. In international law, the pledge of honour of a prisoner of war to observe conditions imposed by his captor, if allowed his liberty. Under The Hague convention the government of a country cannot compel one of its subjects to break such parole, though if the government disapproves of the conditions of parole it is the duty of the combatant concerned to surrender again to the enemy. In a military sense, a parole is a watchword given by the commander of an army or garrison for officers to use. In penal law, it is a pledge of good conduct given by a person convicted of crime as a condition of his or her release from prison. The parole system in penology is steadily on the increase in many countries, notably the U.S.A.

Paros. Island in the Aegean Sea, belonging to Greece. One of the Cyclades group, it is 5 m. W. of Naxos, and has a length of 13 m. and a breadth of 10 m. Pyramidal in shape, it rises in Hagios Elias, the ancient Marpessa, to about 2,500 ft. Near the chief town, Parikia, are the quarries of Parian marble, wrought from ancient times. Paros was colonised by Ionian Greeks who afterwards founded Parium and Thasos. It was captured by the Persians in 490 B.C. and later became merged in the Athenian confederacy. The Arundel marbles were brought to England from Paros in 1667. Its area is 96 sq. m.

Parotid Gland. One of the salivary glands situated just in front of the ear, its duct running on the inner aspect of the cheek to empty itself along the upper jaw. It is generally the first gland to become enlarged in mumps.

Parousia. Greek term for coming, appearance, or revelation. It is used in the Greek version of the N.T. for the Second Advent or Second Coming of Christ (2 Thess. 2). See Messianic Hope.

Parquet (Fr.). Name given to an inlaid or mosaic wooden flooring. Small blocks of wood are arranged in a geometric pattern. Oak is the wood most generally

used, other woods of various colours being added for the more elaborate forms of parquetry.

Parr, CATHERINE (1512-48). Queen of Henry VIII, entered in this work as Catherine Parr.

Parr, GEORGE (1826-91). English cricketer. Born at Radcliffe-on-Trent, near Nottingham, he was the son of a small landowner and farmer. In 1840 he joined the All England team led by Clarke, which he himself captained, 1857-1870. Playing



George Parr, English cricketer

for Notts, he was regarded as the finest batsman of his day. He died June 23, 1891.

Parr, THOMAS (c. 1483-1635). English centenarian, known as Old Parr. He is supposed to have lived in ten reigns, from that of Edward IV to that of Charles I. Tradition said that he was born at Winnington, Salop, and he lived there mostly. In 1635 the earl of Arundel took him to London that he might be shown at court as a marvel, but in London he died on Nov. 15, at the alleged age of 152, being buried in Westminster Abbey. Taylor, the water poet, wrote a pamphlet, The Olde, Olde, Very Olde Man, 1635. The cottage in which Parr lived between Shrewsbury and Welshpool was sold to a namesake in 1917.



Thomas Parr, English centenarian

Parrakeet. Name popularly given to many small long-tailed parrots. The ring-necked parakeet, well known in aviaries, has green plumage with a red collar. It is about 16 ins. long, and is found in India and Cochinchina. Flying in flocks and feeding upon fruit and grain, it is a serious pest to gardeners and agriculturists. The grass parakeets of Australia have beautiful plumage of green and blue, and are popular pets. They spend most of their time on the ground, as do also the swamp parakeet and the ground parakeet, while both have barred tail feathers. See Parrot, colour plate.

Parral or **HIDALGO DEL PARRAL.** City of Mexico, in the state of Chihuahua. An important mining centre and rly. junction, it stands on the river Parral, 120 m. S. of

Chihuahua. Silver is extensively worked in the neighbourhood, and wine making is an industry. Parral has some splendid ancient churches. Pop. 16,000. Parral is also the name of a small town and dist. in the Linares prov. of Chile.

Parramatta. Town and river of New South Wales, Australia, in Cumberland co. The town is a major manufacturing centre and stands on the river, 13 m. W.N.W. of Sydney, with which it is connected by road, electric rly., and river steamer. Pop. 21,000. The river is in reality an extension of Port Jackson, 10 m. in length.

Parratt, Sir Walter (1841-1924). British organist. Born at Huddersfield, Feb. 10, 1841, he

was educated privately, and became organist at S. Paul's church there, 1854-61. He succeeded Stainer at Magdalen College, Oxford, in 1872, and ten years later was appointed organ-



Sir Walter Parratt,
British organist
Elliott & Fry

gist to S. George's Chapel, Windsor, a post he held until his death on March 27, 1924. Professor at the R.C.M. from 1883, he conducted the choral class. He was knighted in 1892, and appointed master of the queen's music. During 1908-18 he was professor of music at Oxford. Parratt, who helped to establish Reger's reputation as a composer in England, revolutionised organ playing. A devotee of Bach, he was regarded as a purist but a splendid performer. *Consult* Life, D. F. Tovey and G. Parratt, 1942.

Parret. River of England. It rises in Dorset, near Cheddington, and flows N.W. through Somerset, past Langport and Bridgwater, to the Bristol Channel, which it enters by an estuary. Near Langport, to which it is navigable, it receives the Yeo and the Isle, and lower down the Tone joins it. Its length is 35 m.

Parricide. Murderer of a father. The term is not recognized in English law, no distinction being made between the killing of a father and any other form of murder. In Roman law the term included the murder of other near relatives, e.g. a grandfather, brother, etc., and was punishable by drowning in a sack. *See* Murder.

Parrot. Name applied in a broad sense to all birds of the order Psittaci, of which there are about 500 species known, from the

warmer regions of both Old and New Worlds. They are distinguished structurally by the form of the bill. Both mandibles are hooked, the lower biting within the larger, strongly curved upper one, which is hinged to the skull. The feet are of the scansorial type, two of the toes being turned backwards.

Parrots have brightly, often gaudily coloured plumage, are monogamous, mostly sociable, and nest in tree holes. They are mainly fruit-eaters, though the kea has in recent years developed a carnivorous propensity. The order includes the cockatoos (Ptyctolophidae), macaws (Conuridae), parakeets (Platyercidae), lorries (Trichoglossidae), the true parrots (Psittacidae), and others. In general use the name parrot is restricted to birds of the family Psittacidae, which are mainly African, and of these the most familiar in the U.K. is the grey parrot (*Psittacus erythacus*), of which large numbers are imported.

The food should be mainly seeds, such as maize, hemp, canary seed, with nuts of all kinds except monkey-nuts; apple, pear, plum, banana; raw carrot, dry biscuit, and a stick of soft wood to cut to pieces. There should always be a good supply of coarse, gritty sand; and two or three times a day the bird should be allowed a drink of water, but a constant supply will be abused. Animal food, even a bone, should never be given. *See* Bird, colour plate; Kaka; Kea; Lory; Macaw; Parakeet; Parrot, colour plate.

Parrot Fish (*Scarus*). Name applied to fish of the family Scaridae, closely allied to the wrasse family, found in tropic seas, one species occurring in the Mediterranean. The teeth are modified to form sharp biting beaks; and this, together with brilliant colouring, has given rise to the popular name. These fish feed upon corals, molluscs, and seaweeds, which they chew in a curious fashion, giving rise to the ancient notion that they were ruminating animals. The Mediterranean species was greatly esteemed for the table by the Greeks and Romans.

Parry. General name of a group of islands in the Arctic Ocean. They are situated N. of Lancaster Sound, Melville Sound, and Barrow Strait, and W. of Baffin Bay. They include Devon, Cornwallis, Bathurst, Melville, and Prince Patrick islands. Named after Sir W. E. Parry, who visited them in his 1819 expedition, they were further explored by the expeditions in search of Sir John Franklin.

Parry Sir (Charles) Hubert (Hastings) (1848-1918). British composer. Born at Bournemouth,



Sir Hubert Parry,
British composer

Feb. 27, 1848, he was educated at Eton and Exeter College, Oxford, and studied music at Stuttgart and in London. In 1883 he was appointed professor of composition and of

musical history at the Royal College of Music, and he became its director in 1895. From 1899 to 1908 he was professor of music at Oxford. He was knighted in 1898 and made a baronet in 1902. He died Oct. 7, 1918. Parry's compositions include symphonies, overtures, and chamber music; several fine oratorios, of which *Judith* and *Job* are best known; and beautiful settings of Milton's *Blest Pair of Sirens*, and Blake's *Jerusalem*. He wrote the *Art of Music*, 1893; *Music of the 17th Century*, 1902; and *J. S. Bach*, 1910. *A Life*, by C. L. Graves, appeared in 1926.

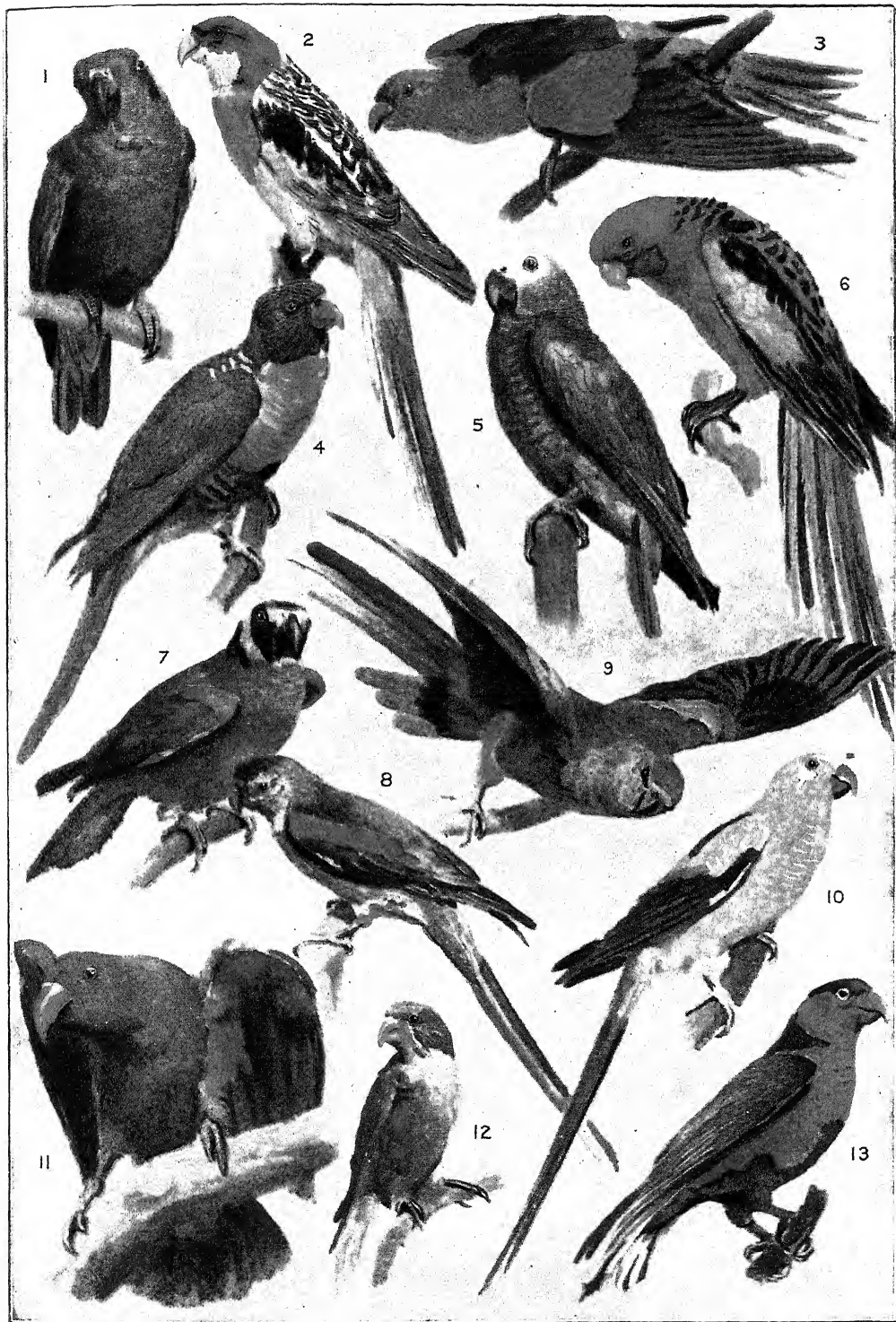
Parry, Sir William Edward (1790-1855). British explorer.

Born at Bath, Dec. 19, 1790, he

entered the navy in 1806, was employed in protecting whalers in Spitsbergen, 1811-13, and five years later accompanied Ross's Arctic expedition. In 1819 he was given command of the *Hecla*, and set sail to find the North-West Passage. Passing through Baffin Bay he made 114° W. During 1821-25 Parry made two other Arctic voyages of discovery, and in 1827 he sailed to Spitsbergen, and there made an attempt to reach the N. Pole by boat and sledge. Surmounting great difficulties, and hampered by the southward drift of the ice, Parry reached 82° 45' N., a record which was unsurpassed for nearly fifty years. Returning in 1829, he was knighted, and later became deputy governor of Greenwich Hospital. He died at Ems, July 8, 1855. His best known works are *Voyages to the North-West Passage*, 1821; *Narrative of an Attempt to Reach the N. Pole in Boats*, 1828. His *Memoirs* were ed. E. Parry, 1857.



Sir W. E. Parry,
British explorer



1 Blue-headed parrot, *Pionus menstruus*, Brazil. 2. Rosella parakeet or parroquet, *Platyercus eximius*, S.E. Australia. 3. Red-shouldered parakeet, *Aprosmictus erythropterus*, Australia. 4. Swainson's lorikeet, *Trichoglossus haematodus*, E. Australia. 5. African grey parrot, *Psittacus erithacus*, W. Africa. 6. Pennant's parakeet, *Platyercus elegans*, S. Australia. 7. Vulturine parrot, *Gypopsitta vulturina*, Brazil.

8 Beautiful parakeet, *Psephotus pulcherrimus*, Australia. 9. Many-coloured parakeet, *Psephotus varius*, S. Australia. 10. Black-tailed parakeet, *Polytelis anthopeplus*, S. Australia. 11. Red-sided lorikeet, *Lorius rufatus*, British New Guinea. 13. Black-capped lory, *Domicella garrula*, N.W. New Guinea.

PARROT: MULTI-COLOURED REPRESENTATIVES FROM THREE CONTINENTS



1. Church of Le Sacré Coeur, Montmartre. 2. Avenue des Champs Élysées, looking towards the Arc de Triomphe de L'Étoile (3). 4. Church of La Madeleine. 5. The Palais du Chaillot now occupying the site of

the former Trocadéro. 6. The Panthéon, built on the site of the tomb of the patron saint of Paris, S. Geneviève. 7. Place de la Concorde, and the Concorde bridge. 8. A familiar boulevard café scene

PARIS: FAMOUS BUILDINGS AND SCENES IN THE FRENCH CAPITAL. See text pp. 6337-41

Parry Sound. Town of Ontario, Canada. On Georgian Bay, at the mouth of the Seguin, it is 150 m. N. of Toronto, on the C.P.R. and C.N.R. Chief industries are planing mills, and making spools and buttons. The surrounding district is noted for pines, hemlock, and hardwoods, and deposits of copper and feldspar. Pop. 5,765.

Parsec. Unit used in astronomy for measuring stellar distances. It is the distance at which the *parallax* (*q.v.*) of a star would be one second of arc. No known star is as close as this, so all stellar distances are represented in parsecs by numbers greater than 1. The nearest, Alpha Centauri, is at a distance of 1.3 parsecs. One parsec equals 3.26 light years or 19.2 million million miles.

Parsees or PARSI (inhabitants of Pars, or Persia). Religious community of India and parts of Persia. In India, where they form a leading section of the native trading classes, they number rather more than 100,000, mostly in Bombay and other places on the W. coast. Their religion, known as Parseism, is the modern form of Zoroastrianism. On the Arab conquest of Persia, in 651, the inhabitants were forcibly converted to Mahomedanism, with the exception of those who fled the country, and a few others whose descendants, numbering about 9,000, maintain their religion in Persia to the present day. Parsees, known, from their regard for fire as an emblem of purity, as fire-worshippers, are also sometimes called Ghebers or Guebers, an Arabic term for unbelievers.

The Parsees of India are the most enterprising and educated native community, and many have devoted their wealth and ability to philanthropic and public ends. Olive-complexioned and black-eyed, they are notable for integrity, benevolence, business acumen, loyalty, and clean living. They expose their dead on iron gratings in towers of silence, where the bones, denuded of flesh by vultures, drop into a pit, and are afterwards removed to a resting-place underground. See India: Zend-Avesta: Zoroastrianism.

Parsifal. Opera by Wagner. Produced at Baireuth in 1882, it is based on Wolfram von Eschenbach's Parzival, a version of the legend of Sir Perceval, in which the story of the Grail is combined with that of the simple, ignorant hero, who attains wisdom through charity and purity of heart. The

opera created a storm of controversy, principally on account of the supposed resemblance of the argument to the life of Christ. It is now accepted as musically one of the greatest operas. See Grail, The Holy: Opera; Perceval.

Parsimony (Lat. *parsimonia*, sparingness). In metaphysics, the law of parsimony deprecates the unnecessary assumption of the existence of anything in order to explain what is admitted to be fact, when such explanation is equally possible without such assumption. In physical and general science the same law asserts that the number of causative factors adduced in the explanation of a phenomenon shall be the smallest possible. This is the doctrine of Ockham (*q.v.*), known as Ockham's razor, that entities should not be multiplied unnecessarily.

Parsing. Exercise in grammar. A group of words, preferably a complete sentence, is taken, and each word is examined as to the part of speech to which it belongs and the relationship it bears to other words in the group. Description should be detailed, *e.g.* a noun is common, proper, or abstract; a verb transitive or intransitive, finite or infinite; an adverb one of time, place, or manner, etc. See Parts of Speech.

Parsley (*Carum petroselinum*). Biennial herb of the family Umbelliferae. It was introduced into Great Britain from Sardinia in 1548, and is used as a seasoning and flavouring in various forms. It succeeds best in a light loam, generally failing to withstand the winter in a heavy or clayey soil. To ensure a succession of crops three sowings of seeds should be made—one in March, another in June, and the third in Aug. in rows

12 ins. apart. When the young plants are 2 ins. in height they may be separated to a distance of about 6 ms. every way, and left until the leaves are ready to cut.

At the end of the second year the crop will be coarse. The old plants should then be eradicated, and a fresh sowing made in a different situation.

Parsley Fern (*Cryptogramma crispa*). Fern of the family Polypodiaceae. Native of Europe, Asia, and Alaska, it forms tufts among the stones in mountainous districts, the fronds springing from a scaly rootstock. The fronds are rather thin in texture, oval-wedge-shaped, bluish green, and much divided like a parsley leaf.

Parsnip (*Pastinaca sativa*). Native British biennial plant of the family Umbelliferae. In its wild state it has no nutritive value, but under cultivation it has developed into a popular edible root vegetable.



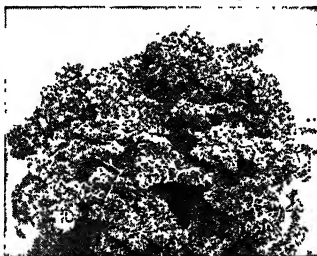
Parsley Fern. 'Lux' at the delicate fronds



Parsnip. Edible roots of the vegetable
By courtesy of Sutton & Sons

able, attaining often a length of 2-3 ft. Parsnips flourish in deep, rich loam which has not been freshly manured; the presence of raw stimulant tends to deform and split the roots. The seed should be sown in the open ground in March, in rows a foot apart and an inch deep. The young plants should be thinned to 9 ins. apart every way, and left until Sept. or Oct. The roots are ready to pull when the foliage dies down, but may be left until touched by early frost.

Parson (Med. Lat. *persona*, a representative). Legal title of one who holds a parochial cure of souls. Holy orders, presentation, institution, and induction are necessary to make a man a parson, and as such the owner of the parsonage house, glebe, tithes, and other dues. The term parson properly belongs only to a rector. A vicar had the same parochial responsibility, but did not hold the church property, being merely the deputy of an absent rector. The term is used in a



Parsley. Plant of Dwarf Perfection parsley
By courtesy of Sutton & Sons

popular sense of any minister of religion. See Clergy; Induction.

Parsons, Sir Charles Aiger-
NON (1854-1931). British inven-

tor and engineer. Sixth and youngest son of the 3rd earl of Rosse, a distinguished astronomer, he was born in London June 13, 1854, and was educated at Trinity College, Dublin, and St. John's, Cambridge. After serving an



Sir C. A. Parsons,
British engineer
Russell

engineering apprenticeship with Armstrong, he acquired in 1884 a partnership in the Newcastle firm of Clarke, Chapman and Co., and built his first turbo-generator. In 1889 he founded at Heaton his own works for making turbines and electrical equipment. Besides revolutionising the application of mechanical power, he designed a mercury pump for mass production of incandescent electric lamps.

In 1893, when most engineers dismissed the possibility of mechanical flight, Parsons built a steam-driven helicopter that lifted itself several yards into the air. Two years later he constructed a model monoplane which on its first test rose 20 ft. and flew 80 yds. His auxelophone, for amplifying musical and vocal sounds without the distortion inseparable from reproduction by a mechanical diaphragm, was adopted by Henry Wood and used at Queen's Hall in 1896. Other experiments resulted in diamonds being made by the crystallisation of carbon, and a non-skid device for motor tires.

Parsons was elected F.R.S. in 1898, and in 1902 received the society's Rumford medal. He was president of the Institute of Marine Engineers 1905-06, and of the British Association 1919-20. Created K.C.B. in 1911, he was the first engineer to be awarded the O.M., in 1927. He died on board ship, Feb. 11, 1931. See *Turbine. Consult Life, R. Appleyard, 1933: The Steam Turbine, R. H. Parsons, 1946.*

Parsons or **PERSONS, ROBERT** (1546-1610). English Jesuit. Born at Nether Stowey, Somerset, June 24, 1546, and educated at Oxford, he resigned his fellowship of Balliol in 1574 to escape expulsion, on account of his tendencies to Roman Catholicism. He went to Rome and became a member of the Society of Jesus, July 4, 1575. Henceforth all his energies were

bent on overthrowing the reformed Church in England, which he secretly visited in 1580. In 1587 he was made rector of the English College at Rome, and in 1591 wrote his *Responsio ad Elizabethae edictum*. He died April 18, 1610.

Parsonstown. This name of a town in Offaly, Eire, has been superseded by Birr (*q.v.*).

Part. In music, that portion of a concerted composition which is allotted to any component voice or instrument. Thus there are four parts in the ordinary hymn-tune: for soprano, alto, tenor, and bass. By analogy, contrapuntal music, such as fugues, etc., which are derived from vocal forms, is also said to be in parts, even though it is performed upon a single instrument, as the pianoforte. A part song is an unaccompanied song harmonised in three or more parts.

In medieval times composers of vocal music did not write their work in score (*q.v.*) but in separate "part books," usually one for each part. Alternatively, the separate parts were displayed side by side on the double page of a book, so that singers of the different parts could use the same book, and sometimes so that singers of different parts could read the music from opposite sides of a table.

Partabgarh. Former state of India, now part of Rajasthan. To the N.W. the hills are peopled chiefly by Bhils; elsewhere is open country with no large rivers. There is a trade in grain and locally made cloth. The town of the same name is 120 m. N.W. of Indore and is noted for its enamelled work. Area of former state, 873 sq. m. Pop., state, 91,967; town, 11,000.

Partabgarh. District of the Uttar union, India, in the Fyzabad division. It lies N. of Allahabad dist., with the Ganges in the S.W. Annual rainfall is 38 ins. The chief crops are rice, wheat, barley, and millet. The capital is Bela, sometimes known as Partabgarh. Area of dist. 1,457 sq. m. Pop., dist., 1,041,024; town, 7,500.

Partenkirchen. Bavarian winter resort, described under Garmisch-Partenkirchen.

Parthenogenesis (Gr. *parthenos*, virgin; *genesis*, generation). Biological term expressing the development of an organism from an egg cell which has not been fertilised. Some animal species, e.g. many gall flies and saw flies, consist of females only; in others males appear infrequently. Among aphids (plant lice) parthenogenesis

is common and, often accompanied by vivipary, leads to rapid multiplication of females during spring and summer. Males are usually produced later on to fertilise the last eggs of the season, which pass the winter as such and develop into viviparous parthenogenetic females the following spring. Other instances are known among rotifers and crustaceans and among plants.

Reduced or haploid parthenogenesis occurs when development is from an unfertilised egg the nucleus of which contains the gametic number of chromosomes. In bees and some other insects such eggs produce males. The occasional appearance of haploid plants of a kind normally diploid suggests that they have arisen from haploid egg cells. Unreduced or diploid parthenogenesis is more common in plants; it takes place when as a result of aberrations in sporocyte divisions an egg cell is formed with the sporophytic number of chromosomes.

Parthenon, THE (Gr., virgin's chamber). Temple of Athena, on the Acropolis, Athens. It was built between 447 and 438 B.C., and was opened on the occasion of the Panathenaic festival in the latter year; the cult of Athena having been previously practised in an older temple on the Acropolis, near the site of the Parthenon itself. The architects were Ictinus and Callicrates, and the structure, which is of the Doric order, consisted entirely of Pentelic marble. In plan the Parthenon is a parallelogram, the cella or nave, 194 ft. long, being divided into two main parts—the Hekatompedos to the E., where Pheidias's great statue was placed, and the Opisthodomos to the W., where the offerings were made. There were eight outside columns at each end, and 17 on each side. The portico at either end was double, i.e. there was an inner line of six columns behind the outer line of eight. Strictly speaking, the Opisthodomos, where the virgin priestess received the offerings, was the Parthenon proper.

Architecturally the Parthenon is the crowning instance of the subtlety involved in the apparent simplicity of Greek construction. Penrose discovered that the horizontal lines are imperceptibly curved, and that the perpendicular lines incline very slightly towards the centre of the temple. The apparently flat floor is slightly higher towards the centre than at the



Parthenon, Athens. Ruins of the ancient temple of Athena, from the north-west

edges; the columns not only taper towards the summit, but are of greater girth at the centre than they are at the base. Little variations of height and thickness occur in the corner columns, according to the intensity of the light that fell upon them, and the fluting is studied with an eye to its relationship with the light.

The chief glory of the Parthenon was the decorative sculpture by Pheidias (*q.v.*) and his school. Of the metopes (*q.v.*) attributed to them, there were originally 92, 41 of which remain in their place, the bulk of the remainder being in the British Museum. The subjects, including combats between Centaurs and Lapithae, and Greeks and Amazons, are treated in high relief. The group of statuary on the eastern pediment represents the birth of Athena; that on the western, the contest between Athena and Poseidon for the possession of Attica. Finally, the continuous frieze round the cella, representing the Panathenaic festival, ranks as the most wonderful pictorial representation in low relief in the world, as regards both scale and treatment. In contrast to the gleaming white marble columns and roof of the Parthenon, the sculptures and mouldings were enriched with colour. With the exception of the inside sculptures, the Parthenon remained nearly intact till 1687, when the explosion by a Venetian bomb of a powder magazine stored here by the Turks dislodged much of its splendid masonry. See *Acropolis*, also col. plate; Art; Athens; Centaur, Elgin Marbles.

Bibliography. The Antiquities of Athens, J. Stuart and N. Revett,

1762-1815; Der Parthenon, A. Michaelis, 1871; Ancient Athens, E. A. Gardner, 1902; The Sculpture of the Parthenon, A. S. Murray, 1903; Athens and its Monuments, C. H. Weller, 1913.

Parthenopaeian Republic. Republican state formed at Naples, 1799-1800. The name is taken from Parthenopis, the old name of Naples. Established under French auspices, Jan. 23, 1799, after the flight of Ferdinand IV the republic was in the hands of patriotic and cultured men who endeavoured to establish a model state run on elevated but quite impracticable lines. Championnet, the French general, did little to help.

When Cardinal Ruffo, commissioned by Ferdinand to re-establish the Bourbon rule, marched up through Calabria with his army of brigands and liberated convicts, the French withdrew, and after a desperate but hopeless encounter, the republicans were defeated at Ponte della Maddalena, Ruffo and his cut-throats entering and sacking Naples, June 13, 1800. An armistice was signed between Ruffo and the republican authorities, which Nelson ignored on his arrival. He arrested and hanged Caracciolo (*q.v.*), and other leaders of the republic, which thus ended in treachery and bloodshed. See Naples.

Parthia. County of ancient Asia. It lay S.E. of the Caspian Sea, and adjoined Media on its W. and N.W. border. It formed a part of the old Persian or Achaemenid empire, and when that empire was overthrown by Alexander the Great, and split up among his successors, was included in the dominion of the Seleucid kings of Syria. About 250 B.C. it

became an independent kingdom under Arsaces I, founder of the Arsacid dynasty. During the succeeding centuries it increased enormously in size and importance, and under Mithradates I (170-138 B.C.) became the Parthian empire, stretching at its greatest extent from the Euphrates to beyond the Indus. Even the all-conquering Romans could make no real headway against this great Eastern power.

Of nomadic Scythian origin, though gradually absorbed by the Persians, the Parthians relied on their formidable mounted bowmen. They promoted Greek civilization, and made Ctésiphon their capital. They overthrew Crassus (*q.v.*) at Carrhae (Haran) in 53 B.C., conquered Syria, 40-38, and were again intermittently at war with Rome with varying success from A.D. 115 to 218. In 226 Parthia was conquered by the Persian, Ardashir I, and absorbed in the rehabilitated Persian empire.

Parthian Shot. Decisive remark by a person supposed to be defeated in an argument. The term originated in a military tactic frequently practised by the Parthians. When the tide of battle appeared to go against them, they would pretend to retreat by galloping away from the enemy; then turning in their saddles, they would discharge their arrows against their pursuers, so throwing them into confusion.

Partick. Dist. of Glasgow, Scotland, formerly a separate burgh. It is situated where the Clyde is joined by its tributary, the Kelvin, which separates it from Glasgow proper. It is in the main an industrial area, with engineering works, shipbuilding yards, etc. In 1912 it was absorbed into Glasgow. Before the industrial developments of the 19th century, Partick was a village at which the bishop of Glasgow had a palace.

Partinico. Town of Sicily, in the prov. of Palermo. It stands on the coastal rly., about midway between Castellamare and Palermo, 15 m. direct W.S.W. of the latter city. It manufactures silken and woollen goods, and trades in wine and oil. Pop. 23,900.

Partisan. Adherent of a party or cause who follows his leader with unflinching devotion. The term is also applied to guerrilla troops who harry an enemy army in occupation of their country. In the Second Great War partisans operated in most German- and Italian-occupied territories and

compelled the enemy to maintain there large numbers of troops urgently required on the military fronts. A partisan was also the name of a long-handled weapon resembling a halberd, used in the 14th and 15th cents. See *Guerrilla Warfare*.

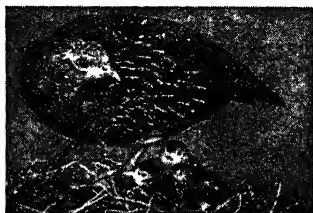
Partition. In law, the actual division, by metes and bounds, of real property which belongs to co-owners. After the Partition Acts of 1868 and 1876 the court could instead order the land to be sold and the proceeds divided. Since the Law of Property Act, 1925, land belonging to co-owners has been held on trust for sale. Partition can take place by the trustees with consent of the co-owners or by order of the court.

Partnership. Defined by the Partnership Act, 1890, as "the relation which subsists between two or more persons carrying on a business in common with a view to profit." Thus there are excluded mere joint ownership of property and the mere association of persons with a common object but not with a view to profit, e.g. a social club, or a philanthropic society. The great characteristic of partnership is that every partner is agent for the firm as a whole.

The law of Scotland differs from the law of England. In Scotland a firm is a separate legal person, just as a limited liability company or corporation is. In England "there is no such thing, in law, as a firm." A partnership firm is merely a convenient way of describing the individuals who compose the firm; and the rights of a creditor are against these individuals, so that he can sue them individually and issue execution against their private estate. In England also all partnership debts are joint. In Scotland partnership debts are joint and several.

As between partners the rights and duties and powers are governed by *articles of partnership*; but these may be varied from time to time by practice, or verbally. A partnership comes to an end by effluxion of time, agreement to dissolve, decree of dissolution, or death of a partner. See *Business Names*.

Partridge. A game bird of which two species occur in Great Britain. The common or grey partridge (*Perdix perdix*) is found throughout Great Britain and Europe, but the French or red-legged species (*Alectoris rufa*) is a native of S. Europe, and was introduced into Great Britain about the close of the 18th century.



Partridge. Common British hen partridge, with a brood of chicks

The French bird is distinguished by its more handsome plumage and bright red legs and beak, and has now become common in England, preferring sandy soil and uncultivated land, as distinct from the grey partridge, which thrives best on rich soil and amid cultivated fields. The French bird is more fleet of foot and difficult to approach than the grey partridge.

Partridges are found in coveys of from five to twenty birds, except in the nesting season, feeding upon insects, leaves, grain and other seeds early in the morning and in the afternoon. During the heat of the day they bask in the sun and take frequent dust baths. At night the covey roosts in a circle in the middle of an open field, each bird facing outwards as a precaution against enemies. The nest is made of grass and leaves placed in a hollow in the earth under a hedge or among the standing corn, and may contain up to 20 eggs.

In Great Britain the partridge shooting season as fixed by the Game Act is from Sept. 1 to Feb. 1 inclusive. The birds are either driven towards the guns or shot over dogs. In large open fields the former is the more usual plan, beaters raising the birds and then driving them towards the guns arranged in line in the form of an arc of a circle. In small fields and broken country walking up the birds over dogs is the better plan, pointers and retrievers being the best dogs. See *Eggs col. plate*; *Game*; *Game Laws*; *Shooting*.

Partridge, Sir BERNARD (1861-1945). British cartoonist. Born in London, Oct. 11, 1861, he was educated at Stonyhurst, and became a stained glass designer and decorative painter. He became a contributor to *Punch* in 1891, was junior cartoonist under Sam-
Sir Bernard Partridge



and eventually (1910) chief cartoonist, making over 2,400 black-and-white drawings. He excelled in the heroic, monumental style and his drawings were unrivalled for facial expression; and his sense of the occasion made his cartoons world-famous, especially during the First Great War, e.g. Unconquerable, depicting the German Kaiser and Albert of the Belgians. Another well-known cartoon showed S. George defending Malta against the dragon in the Second Great War. Knighted 1925, Partridge died Aug. 9, 1945.

Partridge

Berry. Popular name for *Mitchellarepens*, a small trailing evergreen herb belonging to the family Rubiaceae. It has simple leaves, pairs of fragrant white flowers, and red berries. N. America is its home.

The name is also given to a shrub, *Gaultheria procumbens*, of the family Ericaceae.

Partridge Wood (*Andira inermis*) OR CABBAGE TREE. Evergreen tree of the family Leguminosae. It is a native of Jamaica. The alternate leaves are broken into about a dozen oval-lance-shaped leaflets in two rows. It has clustered purple flowers and roundish fleshy pods. The name is also applied to the wood of *Heisteria coccinea*, a W. Indian tree of the family Olacaceae.

Parts of Speech. In grammar, the name given to the different classes of words, the members of which play a special and well-defined part in the sentence. They are generally reckoned as eight in number: adjective, adverb, conjunction, interjection, noun, preposition, pronoun, verb. See *Grammar*; *Parsing*; *Noun*, etc.

Part-song. This style of composition is mentioned under *Part*.

Party. In politics, a body of persons holding the same political opinions and usually opposed by one or more parties holding other opinions. Government by party is the normal condition of things in all countries where popular representation is established. In a different sense the phrase applies where there is only one official party. The word is also used for those who hold similar views on religious or



Partridge Berry. Leaves and flowers with trailing roots

other matters, e.g. a party in the Church of England, and in a more general sense for a body of persons banded together in some common purpose, as a pleasure party. In law, party is a synonym for a litigant, or a person entering into an agreement. See Conservative; Democrat; Labour; Left; Liberal; Republican, etc.

Party-Wall. Wall separating one house from another. The term is, however, often applied to a wall or fence separating the land of one owner from that of another. Before the Law of Property Act, 1925, party-walls usually belonged to both owners as tenants in common; now the wall is usually regarded as divided vertically into two, each owner having half.

Pas (Fr., step). Word adopted in English for certain dances particularised by other French words indicating the number of performers engaged. Thus a *pas seul* is an exhibition of the art of dancing given by a single virtuoso; a *pas de deux*, of *trois*, or *de quatre*, a similar spectacular display by two, three, or four dancers.

Precedence is another sense in which there is good authority for the use of the word *pas* in English, to have the *pas* of anyone signifying the right of going before him on ceremonial occasions. *Faux pas*, a false step or trip, is an accepted term for a social solecism. See Ballet; Dancing; Russian Ballet.

Pasadena. City of California, U.S.A., in Los Angeles co. It is 9 m. N.E. of Los Angeles in the foothills of Sierra Madre Mts., at the head of San Gabriel Valley, and is served by rlys. A residential city and winter resort, it lies in a fruit farming area. At San Marino are the Henry E. Huntington library and art gallery, and botanical gardens. The library contains one of the world's finest collections of MSS. and rare books. The Rose Bowl, a sports stadium in a dry cañon, seats 86,000. Mt. Wilson (q.v.) lies 5 m. N.E. First settled by the Spanish in 1771, Pasadena was a centre of sheep ranches until fruit growers from Indiana arrived in 1873. It was incorporated in 1886. Pop. 81,864.

Pasargadae OR PASARGADA. City of ancient Persia. Situated in the plain now called Mughab, it was established as the capital of Persia by Cyrus the Great until it gave place to Persepolis. The tomb of Cyrus has been identified.

Pascal, BLAISE (1623-62). French philosopher, theologian, and mathematician. Member of an aristocratic Auvergnat family,

he was born at Clermont-Ferrand, June 19, 1623, and educated by his father. As a boy he revealed a



Blaise Pascal,
French philosopher

precocious genius for mathematics; he wrote on sound at 12, invented a calculating machine, and, before the family moved to Rouen in 1641, had completed a work on conic sections which laid the foundations of modern methods. At Rouen he met Corneille and Descartes and—which proved of more significance—a number of Jansenists. His sister Jacqueline was attracted to the convent at Port Royal and wished to enter it. Blaise, who often visited the place with her, encouraged her in this course. To prevent such a happening, their father sent them both to Paris in 1650, but on his death in 1651, Jacqueline at once entered Port Royal. Blaise remained in Paris until 1654, and it is impossible to discover accurately what influences persuaded him that year to embrace a monastic life.

His life at Port Royal was uneventful; he continued his work on mathematics and science. An attack being made by the Jesuits on Antoine Arnauld, the leading teacher there, Pascal was entrusted with the task of answering it. To this fact we owe the *Lettres Provinciales*, 18 letters published anonymously in 1656. Ironical masterpieces, they established Pascal's reputation as one of the greatest stylists in French literature. He was the first to state clearly the nature of the conflict between reason and religion. He divested of pedantry the problems of metaphysics. His affection for the theory of probabilities doubtless underlay his challenge: "Either God exists or He does not; if He does, and you deny Him, you are lost. If He does not, and you affirm Him, no matter." Deeper was his vision of man as a monster linked with two immensities—the wretchedness of despair, and the certainty of a brighter destiny.

At Port Royal he worked at his *Pensées*, a projected apologia of Christianity, but disease made rapid progress, and, being moved to the Paris house of Mme. Périer, his eldest sister, he died there. Aug. 19, 1662. The *Pensées sur la Religion et sur Quelques Autres Sujets* were unfinished, and

not until 1844 was a reliable edition compiled by A. P. Faugère. Pascal's influence on mathematics and science has been profound, particularly his study of barometric pressure. Work on the cycloid, in which he solved problems that had baffled Galileo, Descartes, and Fermat, entitles him to a high place among those who evolved the differential calculus. He can claim to have founded the science of hydrodynamics and, with Fermat, the theory of probability.

Bibliography. Works, A. P. Faugère, 8 vols., 1886-95; L. Brunschwig, 14 vols., 1904-14; Lives (in French), V. Cousin, 5th ed. 1857; J. Bertrand, 1891; E. Boutroux, 1900; V. Giraud, 1905; J. Chevalier, 1930; (in English) Viscount St. Cyres, 1909; H. R. Jordan, 1909; M. Duclaux, 1927; R. Soltan, 1928; M. Bishop, 1937; The Secret of Pascal, H. F. Stewart, 1941.

Paschal. Name of two popes and one anti-pope. Paschal I was pope from 817-24. Paschal II, a Benedictine monk, reigned from 1099 to 1118. Overpowered and imprisoned by the emperor Henry V, he yielded the right of investiture, which his predecessors had refused to allow. He died Jan. 21, 1118. Paschal III was anti-pope in the reign of Alexander III, during 1164-68.

Pasco OR CERRO DE PASCO. Mountain group of Peru, in the dept. of Junin. The mountain systems of Peru form a knot in the neighbourhood of the town of Cerro de Pasco (q.v.). See Andes.

Pasco. Dept. of Peru of which the full name is Cerro de Pasco. It is about 14,000 ft. above sea level, and is connected with Oroya by the Central rly. Good roads run to Lima, Cuzco, and Huanuco. Here are some of the greatest copper and silver mines in S. America. The principal town, Cerro de Pasco, has est. pop. 20,000.

Pas-de-Calais (Fr. name for the Strait of Dover). Department of France. Situated in the extreme N., bounded by Nord and Somme depts., it covers 2,606 sq. m., has a coast on the English Channel, and is mainly a fertile plain with some low ranges of hills. The chief rivers are the Lys and the Scarpe. Wheat, oats, potatoes, and other crops are grown; horses, cattle, and poultry are reared. Coal is mined, and there is a considerable fishing industry. For conveying the coal the dept. has a complete network of canals. Arras is the capital, and in the department are Calais,

Boulogne, Lens, St. Omer, Wimereux, and Agincourt. A region of drained fenland called the Wattergands is famous for its market gardens. Pop. 1,168,545.

Containing Arras, Loos, and Béthune, this dept. saw some of the most stubborn fighting in the First Great War. Here, too, in the part of France nearest the British Isles, the Germans erected launching sites for their flying bombs in 1944, so that the dept. came in for heavy Allied bombing. Even after the invasion of Normandy the German high command thought that a second, probably larger, landing would be made in Pas-de-Calais, and held reserves there. British and Canadian forces cleared Pas-de-Calais Sept. 1 and 2, 1944, except for Calais, where the German garrison held out until midnight, Sept. 30-Oct. 1.

Pasha. Turkish title given to governors of provinces, high military and naval officers, and others. The rank of pashas was formerly indicated by horse tails carried as standards, three denoting the highest grade, two the middle, and one the lowest. Bashaw is an early English form of the word.

Pasque Flower (*Anemone pulsatilla*). Perennial herb of the family Ranunculaceae. A native of Europe and N. Asia, it has a woody rootstock, and leaves very much divided into narrow segments. The dull purple, silky, solitary flowers are supported on stout erect stalks. The seeds have feathery tails $1\frac{1}{2}$ in. long. The folk-name, from Lat. *Pascha*, Easter, is due to the fact that Easter eggs were often stained by rubbing them with the flowers.

Pasquinade. Abusive personal lampoon, or satire. The name is derived from a 15th century cobbler of Rome, Pasquino, famous for his sarcasms. After his death a statue found near his stall was given the name of Pasquino, and to it wits secretly affixed their lampoons on public persons. Thus the lampoons themselves came to be termed pasquinades.

Pass. Low part of a water-parting or divide. Passes generally owe their origin to denudation produced by two streams, which rise close together but on opposite sides of the divide. Sometimes they occur where a river has breached a mountain range. They are of great economic value, since routes connecting the opposite sides of the divide will cross them, or rivers will tunnel below them, as in the examples of the St. Gotthard Pass

in the Alps, and Uspallata or Cumbre Pass in the S. Andes. See Carso.

Passacaglia. Old stately dance, probably of Spanish origin (*pasar*, to walk; *calle*, a street). The dances were one or two in number. The music was constructed over a ground bass in triple time, a feature which led composers to adopt it as a medium for displaying their fertility in devising variations. It was thus very much like the chaconne (*g.v.*), though in the passacaglia the theme might appear in any part. A celebrated example is Bach's passacaglia in C minor for the organ.

Passaglia, CARLO (1812-87). Italian theologian. He was born at Lucca, May 2, 1812, joined the Jesuits at fifteen, became in 1844 a professor at the Collegio Romano, and was in favour with Pope Pius IX. His championship of Italian unity and opposition to the temporal power of the pope led to his expulsion from the Jesuit Society, and he settled at Turin, where the king made him professor of moral philosophy. In 1861 he became a



Pasque Flower. Blooms of the species of *anemone*, formerly used for colouring Easter eggs

member of the Italian parliament, and editor of *Il Mediatore*. Excommunicated in 1862, he died March 12, 1887.

Passaic. River of New Jersey, U.S.A. It winds first in a N.E. direction, and at Paterson turns S. to enter Newark Bay between Jersey City and Newark. At Paterson it makes a sheer descent of 50 ft. It is 98 m. long and navigable for about 10 m. to Passaic city.

Passaic. City of New Jersey, U.S.A., in Passaic co. It stands on the Passaic R., at the head of navigation, 9 m. above Newark and 4 m. below Paterson, and 10 m. N.W. of New York. The state's leading textile manufacturing and processing centre, it produces woollens and worsteds, cotton and linen

goods. Other industrial products include chemicals, dyes, mill machinery, boxes, and biscuits. Settled about 1676 by the Dutch, Passaic was incorporated in 1869 and became a city in 1873. Washington crossed the Passaic here in the retreat of 1776. Pop. 61,394.

Passamaquoddy Bay. Inlet on the E. coast of N. America. An arm of the Bay of Fundy, between the state of Maine, U.S.A., and the province of New Brunswick, Canada, it is 12 m. long and 6 m. wide, and forms a fine harbour, protected by a group of islands. Among the rivers flowing to the bay is the St. Croix. The bay is named from an Algonquin tribe.

Passant. In heraldry, an animal walking past in profile, with its dexter paw elevated. If its head faces the spectator it is passant guardant, and if looking back over its shoulder passant regardant. See Guardant; Regardant.

Passaro. Cape of Sicily. It forms the S.E. corner of the island and is a low, rocky projection on the E. side of the small bay of Porto Palo. Here Admiral Byng gained a naval victory over the Spanish fleet on Aug. 31, 1718. Near here Canadian troops landed July 10, 1943, the day the Allies invaded Sicily during the Second Great War.

Passarowitz OR POZAREVAC. Town of Yugoslavia. It lies near the Morava river, 37 m. E.S.E. of Belgrade, and has considerable agricultural trade, and agricultural schools, being a centre of a rich stock raising and corn growing country. The treaty of Passarowitz, signed on July 21, 1718, by Austria, Venice, and Turkey, with England and the Netherlands as mediators, assigned Moravia to the Turks, but gave Austria the Temesvar, Wallachia as far as the Aluta, Belgrade, and other parts of Serbia. See Turkey.

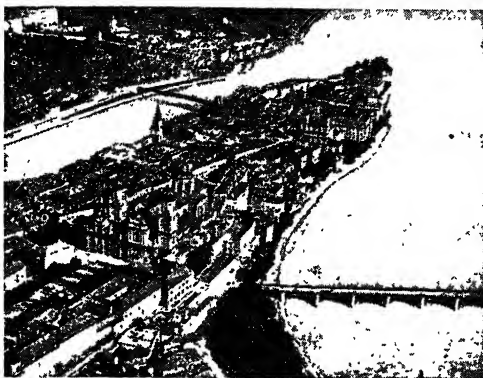
Passau. Town of Bavaria, Germany. It lies on the Danube, here joined by the Inn and Ilz, 92 m. E.N.E. of Munich. It has been called one of the most beautiful towns in Germany, built on the slopes of a hill 1,000 ft. high. The cathedral of S. Stephen dates in part from the 6th or 7th century, and other old buildings include the Gothic hospital church (1345), the Baroque S. Paul's (1618), and the town hall (14th century). Originally a Celtic settlement (Bojodrum), it was later renamed Batava, and was the site of a 1st-century Roman fortress. The scene of a bishopric from 739, it was a clerical principality from the

end of the 12th to the beginning of the 19th century. Partly in the possession of the Grand Duke of Toscana from 1803 to 1805, it became Bavarian in the latter year. Industries in the 20th century have included the manufacture of porcelain and pottery, brewing, and some linen-weaving. It was captured by armour of the U.S. 3rd army, May 3, 1945, and at the end of the war came within the American zone of occupation. Pop. (1950) 35,000.

Passau, TREATY OF. Agreement to conclude hostilities between Roman Catholics and Lutherans, 1552. Signed by Maurice, elector of Saxony, the Lutheran champion, and Ferdinand, king of the Romans, on behalf of the emperor Charles V, its principal clauses provided for holding a diet to consider how best to prevent future religious warfare. It decreed that if the conference should prove abortive, peace should be continued; and gave free exercise of religion to both Protestants and Roman Catholics. See Augsburg, Peace of.

Passchendaele. Village and ridge of Belgium in the prov. of W. Flanders. The former is $7\frac{1}{2}$ m. N.E. of Ypres. The ridge, 200 ft. in alt., extends from Gheluvelt on the S. to the forest of Houthulst in the N., about 18 m., and is the last elevation before the Flanders plain is reached. From the village, on the ridge, Bruges and Ostend can be seen in clear weather.

Passchendaele became notorious in the First Great War as giving its name in common parlance to a prolonged and terrible battle between British and Germans officially known as the 3rd battle of Ypres. It was a British offensive battle, lasting from July 31 to the end of Nov., 1917. The offensive had been prepared by Haig for almost a year beforehand, and was agreed to, with some misgivings, by the British war cabinet in June, 1917. Its declared minimum object was the clearing of the Flanders coast and the German submarine bases, but the British H.Q. staff were optimistic enough to believe that it might lead to a complete break-through, with the employment of "masses"



Passau. The beautiful Bavarian town at the confluence of the river Inn, left, and the Danube

of cavalry in clearing the German forces out of Belgium.

The first objective was the capture of the entire length of Passchendaele Ridge as a jumping-off place. The first attack was delivered by the 5th army (Gough) with the 2nd army (Plumer) on the right and the 1st French army on the left. The British 4th army (Rawlinson) was moved to the coast ready for an advance on that quarter.

The battlefield selected was a reclaimed swamp. Tanks were to be used in force, in spite of protests from the Tank Corps that the terrain was entirely unsuitable. The evidence of weather reports for the district over 80 years also showed that the offensive was badly timed, but the risk was taken. The generals in command expressed serious misgivings about the success of the venture, but did their best to carry out their orders. Foch and Pétain were also opposed to the offensive, their preference being for a period of limited Allied offensives pending the arrival of the promised U.S. armies in 1918.

The attack was preceded by 24 days of violent bombardment which shattered the drainage system of the swampy region. On the opening day of the attack there was a heavy storm. Gough's infantry began the advance at 3.50 a.m., but most of the tanks were soon ditched. German defences were captured on the left, but on the right there were heavy casualties and little progress was made in the bad weather. Gough foresaw the danger of forming a salient within the range of German artillery on hills to his right, and asked for help from the 2nd army in clearing those hills; but the help was not sent for several weeks. Meanwhile the farther the 5th

army advanced on the right the heavier were the casualties.

After a week of steady rain which reduced the battlefield to an appalling condition, a further British attack was made on Aug. 16, E. and N.E. of Ypres, with limited success. The rainfall proved to be far above the average for the time of year, but even had it been below average, the destruction of the drainage system would have made the ground a quagmire. Hundreds of unwounded men and thousands of wounded lost their lives by drowning in the yellow slime of shell craters. Duckboard walks and other tracks were under constant fire. The Germans used mustard-gas shells on a heavy scale, and employed machine-gun fire from low-flying aeroplanes.

Further costly assaults were made, again with some success, on Sept. 26, Oct. 4, and Oct. 9. A further attack on Oct. 12 coincided with the return of violent rain, and brought trifling result and heavy loss. A large-scale attack planned for Oct. 20 was also frustrated by heavy rain, Gheluvelt being taken and lost because British rifles were choked with slime. Finally on Nov. 6, again in a downpour, Canadians fought their way through the swamps into Passchendaele village. After this the offensive gradually petered out.

Results of the Battle

Over 25,000 shells were used in the British bombardment. Ludendorff admitted later that until mid-September the persistence of the attack, with its reckless disregard of casualties, was not without its impression on the German army; after that date there was a change in German tactics, by which they left unoccupied a considerable zone in front of their main line and thereby reduced casualties. Total British casualties amounted to nearly 400,000 (including 17,000 officers). German casualties on the whole front opposite to the British from July 31-Dec. 31 were less than 300,000. Ten weeks' fighting had brought Haig about one sixth of his first objective, five miles only of the 18 m. ridge. The new British line formed a narrow and dangerous salient; and all the ground was lost in the German advance of the following April. Moreover, the damage to British morale was serious. The army had been ordered to achieve the impossible, and there was a diminution of confidence in leadership.

There has been considerable controversy in the attempt to fix

the responsibility, first for launching, then for continuing the battle. Sir W. Robertson, as C.I.G.S., accepted responsibility, while blaming the shortcomings of staff intelligence reports. Undoubtedly there was an inclination at G.H.Q. to override the advice of the men on the spot, and to discredit their views as exaggerating the facts. Gough advised the abandonment of the offensive in mid-August, but Haig was still optimistic at the end of Sept., hoping that with improving weather the cavalry could be utilised even sooner than originally thought. The war cabinet hesitated to override the views of their military strategists, even if they had been given all the facts, which they were not. Support had been given to the original plan only on condition that the offensive would be abandoned at once if it became clear that it would not succeed. Lloyd George advised abandonment in mid-Aug. and again in Oct., but Robertson supported Haig in an optimistic view. To have overridden G.H.Q. would have entailed the dismissal of both Haig and Robertson, a step that would have seriously disturbed public morale at home, especially as the press was reporting each costly, painful advance as a great British victory. A further consideration, by which Haig and Robertson set great store, was that Jellicoe, as first sea lord, had said that unless the Flanders submarine bases were cleared before the end of the year, the whole British war effort would be jeopardised.

This most terrible, costly, and futile battle of all time left a lesson which was not forgotten. Its warning and its bitter memory probably played an indirect part in contributing to the relatively small British casualty lists of the Second Great War. *Consult War Memories, D. Lloyd George, 1933-36 (Chap. LXIII); also Soldiers and Statesmen, Sir W. Robertson, 1926; Field Marshal Earl Haig, Brig.-Gen. J. Charteris, 1929.*

Gordon Stowell

Passenger Pigeon (*Ectopistes migratoria*). Species of pigeon found in N. America, notable for its long wings and long, narrow tail. It formerly occurred in vast flocks, and at its nesting sites every tree for many miles was laden with the nests. It was largely shot for the table, and in one year 15,000,000 birds were procured in Michigan and Pennsylvania. It almost disappeared in 1888 and is now extinct, the last known survivor dying in the

zoological gardens at Cincinnati, in 1914. *See Pigeon.*

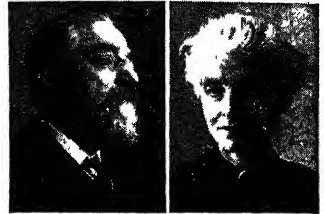
Passe-partout (Fr., passes everywhere). Term used in English as well as in French, both literally and figuratively, in the sense of an expedient for obviating difficulties. Thus it is applied to a master-key, i.e. to a key which opens a series of locks, the subordinate keys opening only one lock each; to an adjustable picture frame or mount; to strips of adhesive paper for the easy mounting of pictures or photographs; and, in printing and engraving, to a stock border which may be used with different centres.

Passepied or **TRIHORS**, also corrupted in English as Paspy, or passy-measure. An old dance of Breton origin, a variety of the Branle, in which dancers imitated shepherds, laundresses, etc., it was brought to Paris before 1600 and remained popular for nearly 200 years. The French ballets of the 17th and 18th centuries contain many examples. The music is in triple time, similar to that of the minuet, but much quicker.

Passeriformes, **PASSERINE** OR **PERCHING BIRDS**. Order of birds, distinguished by the presence of four toes, three in front and one behind, a certain type of palate, and the habit of constructing elaborate and finished nests, etc. The section includes the finches, warblers, thrushes, crows, swallows, shrikes, etc., numbering thousands of species and more than half the existing birds. They are named after *passer*, Latin for sparrow, a member of the order.

Passfield, SIDNEY JAMES WEBB, 1ST BARON (1859-1947). English sociologist. Born in London, July 13, 1859, he entered the civil service in 1878. In 1891 he resigned to devote himself to municipal politics, and the next

year was elected to the L.C.C., of which he was a member for eighteen years. A leading authority on economics, sociology, and municipal affairs, he helped to found the London School of Economics, of which he was professor of public administration,



Lord and Lady Passfield, British sociologists. Lady Passfield continued to be known as Mrs. Sidney Webb up to her death in 1943

1912-27. An original member of the Fabian society, he served on many commissions and committees, and was responsible for the minority report of the poor law commission of 1909, which deeply influenced legislation. He founded the New Statesman in 1913. In 1922 he was elected to parliament as Labour member for Seaham, and in 1929 was created a baron. He was president of the board of trade in the Labour administration of 1924, secretary for the dominions, 1929-30, and for the colonies, 1929-31. He was awarded the O.M. in 1944, and died Oct. 13, 1947.

A prolific writer on sociology, his publications included *Socialism in England*, 1890; *The London Programme*, 1892; *Towards Social Democracy?*, 1916; *Story of the Durham Miners*, 1921; and in conjunction with his wife (v.i.) *The History of Trade Unionism*, 1894; *Industrial Democracy*, 1897; a series of studies of *English Local Government*, 1908-22; *The State and the Doctor*, 1910; *A Constitution for the Socialist Commonwealth of Great Britain*, 1920; *English Poor Law History*, 3 vols., 1927-29; *Soviet Communism: a New Civilization?* 1935; *The Truth About Soviet Russia*, 1942.

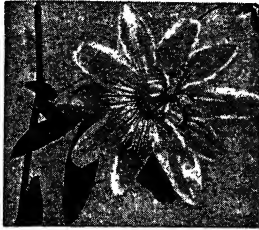
In 1892 Webb married Beatrice Potter (1858-1943), an associate in the Fabian society, joint author of the minority report of the poor law commission, and a sociologist in her own right. The Webbs were among the mainstays of the Labour movement. After Sidney Webb's elevation to the peerage, his wife expressed her desire to continue to be known as Mrs. Webb. Besides collaborating with her husband, she wrote *My Apprenticeship*.



Passenger Pigeon. Extinct species formerly common in N. America

ship, 1926; Our Partnership, 1948. She died April 30, 1943.

Passifloraceae. Family of trees, shrubs, and herbs sometimes called the Passion flower family. They are natives of tropical and sub-tropical regions, especially of S. America. They have mostly alternate leaves and showy, regular flowers. The fruit is a many-seeded berry or capsule, in some species edible.



Passion Flower foliage and bloom.

Passing Bell. Name given to the solemn tolling of a bell, usually of a parish church, at the death or "passing" of a parishioner. The tolling customarily opens with a single note for a man, two for a woman, three for a child.

Passing of the Third Floor Back, THE. Morality play, written by Jerome K. Jerome. It was produced Sept. 1, 1908, at the St. James's Theatre, London. The story tells how "the stranger," an incarnation of Christian influence, appears in a Bloomsbury boarding-house and transforms the characters of all the inhabitants. Sir Johnston Forbes-Robertson played the leading part, the stranger. Although somewhat dated in its detail as well as its style, the play has been kept alive by repertory and amateur performances.

Passion, THE. Term used in a religious sense for the sufferings and Crucifixion of Jesus Christ. It early became a custom in the Church to recite the story of the Passion as told in the Gospels, the narrative portion being sung to Gregorian tones by a tenor, while individual speeches were allotted to other selected voices and the answers of the crowd were sung by a chorus. These musical compositions were known as Passion music.

Among the earliest composers to produce definite Passions in this form were the Spaniard Tom-masso Ludovico da Victoria (1540-1613) and the Italian Francisco Soriano (b. 1549). A little later the German Heinrich Schütz (1585-1672) wrote four Passions and the Story of the Resurrection of Christ. Another German, R. Keiser (1673-1739), introduced the chorale. German genius, profoundly influenced by the Reformation, was particularly sensitive to this form of music, and in the hands of J. S. Bach Passion music attained its highest development. Elsewhere it was gradually modi-

fied and assumed the form of oratorio (*q.v.*).

Passion Flower (*Passiflora*). Large genus of climbing herbs and shrubs of the family Passifloraceae,

natives chiefly of the warmer parts of America. They have variously lobed or undivided leaves, mostly alternate, and stout tendrils by which they climb. The flowers, which are of remarkable structure, are often large and showy, coloured blue, purple, red,

white, or yellow. The cup-shaped receptacle bears 4-5 sepals, an equal number of petals, and a corona of very many spreading filaments. The sexual organs are borne above the corona on an organ known as the gynophore; there are 4-5 spreading stamens with large anthers, and above them is the ovary supporting the clubbed styles. The name (*flos passionis*) is due to the fact that the early Jesuits, with a little straining of the facts, saw in the flower numerous emblems of the Crucifixion.

Passion Fruit. Fruit of the granadilla species of the passion flower (*v.s.*). It is about 2 ins. in diameter, containing within a hard, shrivelled, stringy shell a gelatinous pale yellow pulp with greenish pips. It is cultivated in Australia, where it is used to flavour ice cream, and in the W. Indies, where it is known as the sweet calabash.

Passionists. R.C. order of priests and laymen, entitled the Congregation of Discalced Clerks of the Most Holy Cross and Passion of Our Lord Jesus Christ. It was founded about 1730 by S. Paul of the Cross (1694-1775), and was formally approved by the pope in 1741. Its special work is to conduct missions and retreats, and to undertake parochial work when desired by the bishop. The usual life vows are taken. The order came to Great Britain in 1841, and has several houses there, the headquarters being at Highgate, London. In America it has over a hundred houses.

Passion Plays. Scriptural plays developed in France and Germany in the Middle Ages. Derived from old Easter plays, they were enacted not in the churches but by brotherhoods under clerical direction in the open market, representing the Passion of Christ and employing some-

times hundreds of amateur actors. Variations of the texts are preserved: the Confrérie de la Passion (Paris), the 14th century St. Gall, the 1514 Heidelberg, the Bolzano, Eger, Hamburg, Hildesheim, and other plays. In modern days the Oberammergau (*q.v.*) play, held every ten years, is the most famous.

Passion Week. In the ecclesiastical year, the week following Passion Sunday, or the 5th Sunday in Lent. The name is sometimes applied to Holy Week (*q.v.*).

Passive Resistance. Act of resisting a law or system of government without recourse to active or militant methods. It is usually resorted to on conscientious grounds, which may be purely moral, or in which political and national considerations are involved. The refusal of Quakers and others to pay tithes and impositions of the Church of England is an example of the former, and there were many examples and forms of the latter in the Nazi-occupied countries of the Second Great War. The civil disobedience and boycott movement of Gandhi in India was passive resistance, as was refusal to undertake military service in Great Britain. The pacifist proposal that in time of war civilians should interpose themselves unarmed between the combatants, suggested passive resistance in an extreme form.

The term is historically associated with the Free Church passive resistance movement, which originated with the passing of the Education Act of 1902. These Free Churchmen consistently objected to pay a rate which provided for sectarian teaching in voluntary schools. They objected to pay that portion of their local rate devoted to education. Some paid when summoned after making a protest in public. Others refused to pay when summoned, and allowed their goods to be distrained upon for the amount in question. Others refused distraint and underwent regular terms of imprisonment. The movement died away after the Liberal govt. came to power in 1906, though the Act remained on the statute book.

Passmore Edwards Settlement. Name by which the London social welfare institute, the Mary Ward Settlement (*q.v.*), London, W.C., was known from 1897 to 1920. It was named after J. Passmore Edwards (*q.v.*).

Passover (Heb. *pesach*; Gr. *pascha*). Ancient Jewish feast. Called in the Bible the Lord's

Passover, and instituted at the time of the exodus, it was so named from the passing over by the destroying angel of the thresholds of the Israelites, red with the blood of the sacrificial lamb, when all the first-born of Egypt were smitten (Ex. 12). It was afterwards and still is observed as a symbol of the deliverance and of the beginning of harvest, the seven days of observance beginning on Abib or Nisan 14. The whole feast is also called the festival of unleavened bread. In modern times the festival closes with the words, "Next year in Jerusalem." It was observed by Christ the night before His crucifixion, when He instituted the Eucharist; and He is called "our Passover" (1 Cor. 5, vv. 7-8). See Easter; Last Supper; consult History of the Jewish Church, A. P. Stanley, 1876; Hebrew Feasts, W. H. Green, 1886.

Passport (Fr. *passport*). Warrant of safe conduct and licence to travel issued in the name of a sovereign state to its subjects wishing to visit foreign countries. British subjects require passports when travelling to or from British dominions or colonies. In international law a passport is a document issued by a belligerent permitting foreigners to travel within its territory. Every country has the sovereign right to regulate the admittance or exclusion of foreigners to or from its territories. Until the First Great War, passports were not required for travel to most European countries or the U.S.A., but since then they have become necessary for all British subjects leaving the U.K. and all foreigners entering it. They must be shown both to the British authorities at the home port and to the foreign authorities when arriving in or leaving the other country. The need for a visa (*q.v.*) on passports was mutually abolished during 1947 between the U.K. and France, Belgium, Luxemburg, the Netherlands, Denmark, Norway, Sweden.

Passports are issued to British subjects on the recommendation of a banker, mayor, magistrate, minister of religion, barrister-at-law, physician, etc., resident in the U.K. Two unmounted copies of a recent photograph certified by the individual recommending him, of which one is attached to the document, are required. Passports, for which a charge is made, are obtained from the Passport and Permit Office, Dartmouth Street, Westminster, S.W.1, or from the branches at 36, Dale Street, Liverpool, 2, and

10, Bothwell Street, Glasgow, C.2. Joint passports for husband and wife (with their children under 16) if travelling together are issued. A passport is valid for five years, and may then be extended for a further five years, after which a new one must be obtained. Employment exchanges can supply information about current passport regulations.

Passy. A western suburb of Paris, France. Near the Bois de Boulogne, it extends from the Chaillot (Trocadéro) to the fortifications, and is a residential quarter. See Paris.

Past and Present. Study of social and political conditions by Thomas Carlyle. It was first published in 1843. Developing ideas earlier expressed in Sartor Resartus and Heroes and Hero Worship, it discusses the problems of capital and labour, aristocracy and people, as they appeared in the first half of the 19th century, and contrasts them with social conditions in the Middle Ages, illustrated by the chronicle of the abbey of Bury St. Edmunds, written by Jocelin de Brakelond (c. 1200).

Pastaza or PASTASSA. River of S. America. Rising in the Andes and flowing generally S.E. through Ecuador for some 400 m., it joins the Marañon in Peru 30 m. W. of the point where the last-named river receives the Huallaga.

Paste (prob. Gr. *pastē*, barley broth). Specifically a plastic mass made from flour and water; generally any mixture of similar properties, e.g. adhesive made from flour and/or starch and too thick for liquid flow. Paper-hangers' and bookbinders' paste is usually made from flour with a small amount of alum added.

The term is also used for the glass preparation used in making imitation gems, and generally for any soft plastic mass, e.g. the clay of potters and the mixture of synthetic resins and filler made up and put into moulds for hardening into the required shape by heat and pressure.

Pasteboard. Paper pasted together to make thick sheets. After pasting it is pressed, dried, calendered, and cast into moulds. It is largely used as mounts for pictures. Bristol board is a finer pasteboard for pen-and-ink drawing. The word also denotes the wooden board upon which paste crust is rolled. See Card-board; Strawboard.

Pasteur, Louis (1822-95). French biologist. Born at Dôle, Dec. 27, 1822, and educated at the



Louis Pasteur,
French biologist

École Normale, Paris, he was by 1857 its scientific director. In 1863 he was appointed to the École des Beaux Arts as professor of geology, physics, and chemistry, and from 1867 to 1889 he was professor of chemistry at the Sorbonne. He established the Pasteur Institute in Paris, 1888, and remained its director until his death, Sept. 28, 1895.

Pasteur was one of the most brilliant investigators of the 19th century. He first attracted notice by his solution of the problem presented by isomerism (*q.v.*), which ultimately led him to the discoveries connected with fermentation, with which his name is universally associated. In connexion with the latter he showed that vinous, acetic, and lactic fermentations were caused by micro-organisms existing in the air, and he formulated methods for the prevention of "diseases" in wines, beer, vinegar, etc. At the request of the French government he undertook a study of silkworm disease, indicated the bacterial cause and cure, afterwards isolating the bacillus of anthrax, an epoch-making discovery which led to his preparation of vaccines for various diseases, e.g. fowl cholera, rabies, and diphtheria. These last results, which have been extended by followers of Pasteur, have left their imperishable mark on preventive medicine throughout the world. The more dramatic aspects of his work were brought out by a film, in which Paul Muni played Pasteur, shown 1936. See Bacteriology; Hydrophobia; Milk. *Bibliography.* Pasteur and after Pasteur, S. Paget, 1914; Lives, G. T. Hallowell and C. E. Turner, 1930; P. Compton, 1932; R. V. Rudot, 1937.

Pasteur Institute. Research laboratory established for the purpose of combating hydrophobia; named after Louis Pasteur. The first and most important, L'Institut Pasteur, was erected in Paris by public subscription, and opened Nov. 14, 1888.

Subsequently other Pasteur institutes were established throughout Europe, the U.S.A., etc., including one at Kasauli, in the Himalayas.

Pasteurisation. Preservation of wine, milk, and other liquids from deterioration by heating.

The process is named after Pasteur, who showed that sufficient heat killed all micro-organisms. Two methods are officially recognized: (a) The Holder method in which milk is held at a temperature of 145–150° F. for half an hour; (b) the short-time process, in which milk is heated to 162–165° F. for 15 secs. In both methods the milk must be immediately cooled to 55° F.

Pasticcio (Ital., a pie). In music, a medley of favourite excerpts from different operas, whether or not by the same composer is immaterial. It was very popular during the 18th century.

In art and literature pasticcio or pastiche (Fr.) denotes a work made up from fragments of other works, or borrowing motives or suggestions from them.

Pasto. City of Colombia, the capital of the dept. of Nariño. It stands at an alt. of 8,650 ft., at the foot of Pasto Volcano (alt. 14,000 ft.), 140 m. N.E. of Quito. It is on the route for the great pass between Quito and Popayán, is the seat of a bishop, and has a university. Its manufactures include decorated pottery, hats, and blankets and other woollen goods. Founded by Pizarro in 1539, it was twice destroyed in the wars of independence and was ruined by an earthquake in 1827. Pop. 49,644.

Paston Letters. A series of letters and other documents written between 1422 and 1509, mostly addressed to or written by members of the Paston family. Rising from obscurity about 1400, the Pastons, of a village of that name near North Walsham, Norfolk, acquired land and influence in the county. William Paston (1378–1444) was justice of the common pleas under Henry VI. His son John (1421–66) acquired by doubtful means Caister Castle and the other estates of Sir John Fastolf, for which the family had to fight as well as litigate. Sir John Paston (1442–79) was a courtier of Edward IV, but went over to the Lancastrians.

The letters and other papers, of which nearly 1,200 exist, form an invaluable record of the political, social, and economic life of the time, and of its manners and morals, and especially of the troublous times of the Wars of the Roses. A complete collection, with valuable introductions, was edited by James Gairdner, 1872–75.



Pastor, also called rose-coloured starling.
W. S. Berridge, F.Z.S.

Pastor (Lat. *pascere*, to feed). Literally a shepherd, but now used for a minister of religion, especially among the Lutherans. The office is known as the pastorate. See Lutheranism.

Pastor. Bird, known also as the rose-coloured starling (*Pastor roseus*). The plumage is pink on the back and under parts, violet-black on the head, neck, and tail, and greenish-black on the wings. It nests in W. Asia and S.E. Europe, and feeds largely on locusts. At times it migrates in large numbers to W. Europe, and occasional specimens are met with in England.

Pastoral. Literary term denoting poetry, romance, or drama setting forth the shepherd's life in a more or less conventionalised or idealised fashion. In the more modern manifestations it may be said to be the homage which artificiality pays to simplicity. Originating in the idylls of the Greeks of Sicily, notably Theocritus, which were imitated by Virgil in his Eclogues, pastoral poetry was revived by the Renaissance poets on the Continent, and in England became something of a new type in The Shepherd's Calendar of Spenser and his followers, though it degenerated in the artificiality of the 18th century.

Pastoral drama—which has been described as the bucolic idyll in dramatic form—flourished in Italy from the close of the 15th century, and may be said to have reached its height with Tasso's *Aminta*, 1573, and Guarini's *Pastor Fido*, 1585. Those plays had considerable influence on the pastoral drama in England, which, however, was marked by artificiality even in its most notable examples, such as Fletcher's *Faithful Shepherdess*, 1610, and Jonson's *Sad Shepherd*, 1636. Outstanding examples of pastoral romance are the *Diana* of the Spaniard Montemayor, c. 1559, and Sidney's *Arcadia*, 1590. In pastoral lyrics the century that followed Spenser was particularly rich. Pastoral setting or allusion has frequently been a convention in the writing of funeral elegies from Spenser's *Astrophel*, 1586, and Milton's *Lycidas*, at Arnold's *Thyrsis*, 1861. Consult English Pastorals, intro. E. K. Chambers, 1906; Pastoral Poetry and Pastoral Drama, W. W. Greg, 1906.

Pastorale. Musical term denoting (1) a 17th century kind of opera with a rural or idyllic subject; (2) an instrumental piece suggesting by conventional means, such as the use of compound time and of placid and flowing melody, the atmosphere of the countryside. A typical example is the pastoral symphony in Handel's *Messiah*. Beethoven's *Pastoral Symphony*, No. 6 in F, is the most extended example.

Pastoral Letter. Name given to a written communication by a bishop to the clergy and laity of his diocese on matters of Church organization and government. It is so called from the fact that a bishop is regarded as a spiritual shepherd. The Epistles of S. Paul to Timothy and Titus are called pastoral epistles.

Pastoral Staff. Name for the symbol of authority given to a bishop or abbot at his consecration, also known as a crosier (*q.v.*). Some authorities, probably mistakenly, distinguish between them.

Pasture. Land used for grazing. Some pasture lands are uncultivated, some are cultivated. Uncultivated pastures are far greater in extent. In the U.K. and W. Europe they are represented by rough and hill grazings; in S. Africa by the veldt; in N. America by the prairie; in S. America by pampa; and in Australasia by the montane tussock grasslands and others. Most uncultivated pastures have been greatly modified by human action, especially during the 19th and 20th centuries. They are well developed in arid areas, at high elevations, and in storm-swept localities.

Cultivated pasture, although not nearly so extensive in total area, is, in the aggregate, much more important agriculturally. Usually, this type of pasture is best developed in countries having relatively humid climates, where it replaces forest or woodland. Cultivated pasture is, therefore, characteristic of large areas throughout the U.K. and in other parts of Europe, in New Zealand, in the humid maritime districts of N. America, in parts of Southern Australia, and in the Cape prov. and Natal, S. Africa.

Cultivated pasture may again be sub-divided into permanent pasture and leys (see *Ley Farming*). Permanent pasture has, for the most part, been cultivated at one time or another. This is made evident in the U.K., for example, by the fact that most permanent

pasture fields are in ridge and furrow. Though much of this land was deliberately sown, much was probably not; and the present condition of the permanent pastures of the U.K. bears no relationship to any seeds that may originally have been sown on them.

Most leys have ceased to function as leys after the 10th to 15th year, depending on situation and treatment. On poor soils or under indifferent farming, the ley is ready for ploughing after the fourth or fifth year from sowing. The outrun ley is no longer highly productive and may, in this respect, be even less so than is permanent grass. The ley ceases to be a ley when the species first sown in it are replaced by the indigenous grasses and herbs.

Plants used for Pasture

The chief pasture plants used in seeds mixtures for leys are ryegrass (*Lolium* spp.), cocksfoot (*Dactylis glomerata*), timothy (*Phleum* spp.), fescue (*Festuca* spp.), the clovers (*Trifolium* spp.), and the medicks (*Medicago* spp.). In some countries and for special conditions, use is also made of such plants as foxtail (*Alopecurus* spp.), meadow grass (*Poa* spp.), dogstail (*Cynosurus* spp.), Bent (*Agrostis* spp.), Brome (*Bromus* spp.), oat grasses (*Avena* and *Arrhenatherum* spp.), bird's foot trefoil (*Lotus* spp.), sweet clover (*Melilotus* spp.). In other countries, notably in Africa, the Americas, India, and certain parts of Australasia, where the climate is hot and with long dry spells, leys are sometimes based on such plants as Rhodes grass (*Chloris* spp.), star grass (*Cynodum* spp.), paspalum (*Paspalum* spp.), panidums (*Panicum* spp.), elephant grass (*Pennisetum* spp.).

Pasture may be said ecologically to be a pioneer form of vegetation; the tendency in natural development is always towards regeneration of scrub, woodland, or even forest.

The farmer aims at preventing this progression by maintaining open pasture land on which he feeds his livestock. To do this effectively and to maintain his pasture in good condition, the farmer has to pay special heed to the proper management of the pasture lands, whether they be cultivated or uncultivated. To maintain high production from season to season, pasture land must be adequately manured (although in many parts of the world the application of manures is not at present warranted for economic reasons). In the case of cultivated pasture, special care is taken to

sow proper seeds including only those species in the seeds mixture which are capable of producing the desired class of pasture.

In 1947 the total area of pasture land of all descriptions in England and Wales was 19,422,000 acres. Of this area 5,567,000 acres were uncultivated heaths and moors, mostly at high elevation; 10,252,000 acres were permanent pasture; 3,603,000 acres were under leys of all kinds. In Scotland in 1947 there were 10,945,000 acres of rough grazings (uncultivated), 1,130,000 acres of permanent pasture, and 1,424,000 acres of ley. Between 1939 and 1943, England, Wales, and Scotland ploughed up about 6 million acres of permanent pasture; during 1944-47 there was little further ploughing up, so that in 1947 England and Wales together still had 10 acres of permanent pasture to every three acres under ley, although the latter is known to be, on the average, at least twice as productive as ordinary old pasture.

Among overseas countries New Zealand is in a foremost place in the production of meat, butter, cheese, and other grassland products. She has realized fully that grass, which provides the best and cheapest food for cattle and sheep, is a true crop and, further, that pasture must be farmed well and intelligently if it is to produce at the best economical level of output.

William Davies, D.Sc.

Patagonia. Extensive region forming the southern extremity of S. America and belonging to Argentina and Chile. It extends S. from the Rio Colorado to the Strait of Magellan, which divides it from the islands of the 'Tierra del Fuegian archipelago. Originally claimed by both Chile and Argentina, a treaty between these countries was ratified in 1881, which apportioned the territory E. of the Andes to Argentina and the W. coastal region to Chile.

Argentine Patagonia is divided into the territories of Rio Negro, Neuquen, Chubut, and Santa Cruz. It is bordered on the W. by the Andes, which constitute the water-parting of the Atlantic and Pacific systems, with an alt. of from 3,000 ft. to 6,000 ft.; the range is broken by several lakes lying partly in Argentina and partly in Chile. The terrain slopes in a succession of terraces towards the E., interspersed by numerous ravines and valleys. The chief rivers are the Colorado, Rio Negro, Chico, Chubut, Gallegos, and Santa

Cruz, mostly impeded by rapids, and there are a large number of salt lakes and lagoons. Though arid, sterile, and bush-covered for the most part, the valleys and margins of rivers in the N. portion are fertile. The climate is cool and violent winds prevail.

In Argentine Patagonia there are estimated to be almost 20,000,000 sheep, and the export of wool averages 50,000 tons per annum. There are large canning plants. Mammals include guanacos, armadillos, viscachas, pumas, foxes, and skunks; among the numerous birds are condors, vultures, hawks, partridges, rheas, and flamingoes. The native Indians, noted for their tall stature, are nomadic and thinly scattered over the territory. The most important tribes, the Tehuelches and Gennakens, are fast dying out. Area, 322,904 sq. m., or, including the E. section of Tierra del Fuego, 331,203 sq. m. The pop. is est. at 100,000.

Chilean Patagonia is a coastal strip W. of the Andes, consisting of the provs. of Chilo and Magallanes, which lie S. of the prov. of Llanquihue. The coast is fringed with innumerable islands, including the archipelagos of Chonos, Queen Adelaide, and Madre de Dios. The coasts are steep and rugged, and cleft by numerous fjord-like openings. The lower slopes of the mountains are densely forested, yielding valuable timber. There are no rivers exceeding 15 m. in length. The climate is raw and damp, and in the S. snow and sleet are of almost daily occurrence. Its area is 72,334 sq. m. Pop. about 40,000, of whom one-third are foreigners. One-fifth of the cultivated land is British-owned, and 90 p.c. of the larger sheep farms (3,500,000 head of sheep) are managed by Scots. There are large meat packing and refrigerating plants. Coal is extensively mined.

First seen by Magellan in 1520, Patagonia was afterwards visited by various Spanish and English explorers. Scientific explorations were also made by Darwin, Fitzroy, and several Argentine travellers. See Chile.

Pataliputra. Capital of the Magadha kingdom in ancient India. Extending for 9 m. along the right Ganges bank, between the modern Bankipur and Patna, it is now submerged beneath 14 ft. of alluvium. Completed by Udaya, about 450 B.C., it was visited about 300 by Megasthenes, ambassador of Seleucus to the court of

Chandragupta, of whose dynasty it was the capital. The Greeks knew it as Palibothra. Remains of its palisaded walls, whose many gates and towers he described, have been recovered. Asoka (*q.v.*) added masonry walls, and held there the 3rd Buddhist council about 246. By the 7th century it had become a heap of ruins. On its site stands Bankipur, the W. extremity of the city of Patna. *See* Magadha.

Patan. Town of Baroda, Bombay state, India. It is 62 m. N.W. of Ahmadabad, and is one of the oldest towns in Gujarat. It manufactures weapons, silks, and cottons, contains over 100 Jain temples, and is noted for its Jain palm leaf MSS. Pop. 36,549.

Patani. Monthon or prov. of Siam. It is in the S.E., on the S. China Sea, with a land boundary with Malaya. It is drained by the Patani, the largest of many N.-flowing streams. Tin, lead, gutta-percha, and timber are exported. It was formerly an independent state, dominating all the E. coast of the peninsula, but was annexed to Siam in 1832. After the Second Great War a movement was started among the 95 p.c. Malay pop. to ally Patani with the Malayan Union or with Indonesia, but the peace treaty with Siam, 1946, frustrated these hopes. Pop. 310,000.

Patas Monkey (*Erythrocebus patas*). Large and brilliantly coloured guenon, native of W. Africa.



Patas Monkey of West Africa

It is an agile, long-tailed species, of a foxy red colour on the upper parts and white below. The face is blue, with long hair on the cheeks, a narrow black band above the eyes, and moustache-like lines of the same colour on the upper lip. The length of head and body is about 16 ins., and that of the tail the same. *See* Monkey.

Pataudi, IFTIKHAR ALI KHAN, NAWAB OF (b. 1910). Indian

cricketer. This ruler of a small state in the Punjab was born March 17, 1910, and was awarded his cricket blue at Oxford in 1929. He qualified for Worcestershire in 1932 and went with the English test team to Australia. In 1934 he also opposed the Australians and headed English batting averages. When an Indian team toured England in 1946 the nawab was captain, but failed to repeat the brilliance of his earlier play.

Patay. Village of France. In the dept. of Loiret, it is 13 m. N.W. of Orléans. Here a battle was fought between the English and the French, June 19, 1429. Joan of Arc was continuing her victorious career, and to check her the duke of Bedford sent out a force from Paris to the assistance of the English near Orléans. Under Talbot, this reached Patay only to learn that the English leader, the duke of Suffolk, was a prisoner. Moving forward, the English came unexpectedly into contact with the scouts of a French force, chasing a stag. Urged on by the Maid, the French men-at-arms engaged the enemy before the English bowmen were ready. The fight ended in the defeat of the English; Talbot was made a prisoner, and only a remnant of his army got back to Paris.

Patch. Small piece of court plaster or black silk worn on the face. It was used to conceal a scar or blemish, or to enhance beauty by contrasting with the fairness of the skin. It came into fashion in the reign of Charles I, its use being banned by the Puritans. After the Restoration it was worn extravagantly and in many shapes.

Patch, ALEXANDER MCCARRELL (1889-1945). An American soldier. The son of an army officer, he was born Nov. 23, 1889, in Arizona, and graduated from West Point in 1913. He served in France in the First Great War. Promoted maj.-gen., 1942, he commanded the troops who relieved the marines on Guadalcanal in 1943. In 1944 he led the U.S. 7th army, which on Aug. 16 landed in S. France, and was promoted lieutenant-gen. His troops drove N., made contact with Gen. Patton's 3rd army, and joined the assault on Germany. In 1945 Patch was recalled to the U.S.A. and named head of the board set up to study post-war army requirements, but died from pneumonia on Nov. 21.

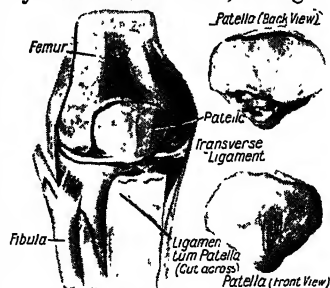
Patel, VALLABHBHAI JHAVERBHAI (b. 1875). Indian politician. Born Oct. 31, 1875, he was educated at Nadiad high school and

became a district pleader at Godhra; after study in England he was called to the bar at the Middle Temple, returning to practise at Ahmadabad. In 1916 he became associated with Gandhi, and led the Bardoli "no tax" campaign. He was president of the Indian nationalist congress in 1931, chairman of its parliamentary sub-committee, 1935-42, and several times gaoled for subversive activities. His violent denunciations of the British in 1945 were held responsible for outbreaks. In the interim government formed in 1946, he held the portfolio of home affairs, as he did after the independent Indian government was formed in 1947.

Pateley Bridge. Market town of the W. Riding of Yorkshire, England. It stands on the Nidd, 10 m. S.W. of Ripon, with a rly. station. The chief industries are mining lead and quarrying stone. Near are caverns with stalactites and stalagmites. Market day, Sat. Pop. 7,065.

Patella or KNEE-CAP. Sesamoid bone, i.e. a bone developed in the tendon of a muscle, situated at the front of the knee-joint. It is roughly triangular in shape. The posterior surface is covered with cartilage, and articulates with the femur or thigh-bone. The upper margin passes into the tendon of the quadriceps extensor or large muscle forming the front of the thigh. From the lower margin springs the infra-patella tendon, by which the bone is fastened to the anterior surface of the tibia.

Dislocation of the patella may be outwards, inwards, or sideways, the first being much the commonest form. Reduction is effected by manipulation. Fracture of the patella may be the result of direct violence, or may follow a vigorous muscular effort, such as may be made in an endeavour to prevent a fall, the bone breaking transversely across the middle; wiring of



Patella. Left, knee-joint from the front, showing position of patella; right, front and back view of bone

the bony parts is usually a necessary part of treatment. See Anatomy; Knee.

Patén. In the service of the Eucharist, the plate on which the consecrated bread is placed; in the Mass, the plate on which the Host is laid. The term also describes the covering of the chalice used at these services; in this case it is usually of gold or silver-gilt.

Patent (Lat. *patere*, to lie open). Official document issued by the sovereign conferring an exclusive right or privilege. Titles of nobility are conferred by letters patent. A patent is the sole right for a term of years of the proceeds of an invention, the person who holds such a right being called the patentee. Patent leather has a japanned polished surface.

by law, but any other publication known to the Patent Office examiner can be cited. The law gives to the comptroller of patents the power of refusing the grant of a patent in cases in which the invention has been wholly and specifically claimed or described in specifications to which the search has extended or other prior publications cited. Complete specifications can be amended at the instance of the applicant to distinguish an invention from those described in cited prior publications. Alternatively, the comptroller may insert in the specification, by way of warning to the public, specific reference to any earlier publication held to describe or claim an applicant's invention. An inventor may, before applying for a patent, but after notice to the comptroller, place his invention on view at an exhibition certified by the board of trade without invalidating, by reason of prior publication, a patent which he may subsequently obtain.

The normal protection period of 16 yrs. may be extended by the court if it can be shown that the patentee has received inadequate remuneration having due regard to the merits of the invention, or has suffered loss through engagement of the U.K. in war.

Grounds of Opposition

Before a patent is granted, but after the acceptance by the Patent Office of the complete specification, interested parties may, within three months, oppose, and, if successful, prevent the sealing of the patent, or obtain an amendment of the complete specification. An opposition can be based only upon one or more grounds of which the following is a summary: That the invention has been obtained from the opponent, or someone of whom he is the legal representative; that the application lacks invention; that it has been publicly used or disclosed in a document published in the U.K. before the date or the effective date of the application; that it has been claimed in the U.K. in an application of prior date or prior effective date; or that it is not sufficiently or fairly described in the complete specification. Oppositions are conducted before the comptroller, from whose decision an appeal lies to the patent appeal tribunal. Similar action to opposition may be brought in the Patent Office within 12 months of the sealing of a patent. Action to revoke may be brought at any time in the

PATENT LAW AND PRACTICE

This article, by a chartered patent agent, deals with a branch of law which is of great importance commercially. See also Company Law; Copyright; Monopoly; Trade Mark

The patent (Lat. *patere*, to lie open) law of the U.K. may be said to date from the statute of monopolies, 1623. Before the passing of that statute patents were granted by the crown with a view to improving the economic condition of the country, industry being encouraged by prohibiting or restricting competition. The grant of monopolies freed from competition led to abuses prejudicial to the state, and was followed by their restriction by statute. According to the statute of monopolies the grant of a patent was restricted to the "first and true inventor," who, according to present-day practice (Patents Act, 1949), may comprise several classes of persons, and includes not only the actual inventor, but the first importer of an invention into the U.K.; an assignee can also apply. The patent dates from the date of filing the complete specification, with priority from the filing of the provisional specification, if any, and the applicant for a patent in any of a number of overseas territories (including most industrially important countries) or his assignee can, by making application in the U.K. within twelve months of his first application, obtain a patent with priority from that application.

The subject matter of a valid patent must comprise a manner of new manufacture, or method of testing applicable in manufacture. Moreover it must not be contrary to law or morality or well established natural laws. Novelty alone does not necessarily imply invention, and of itself is insufficient to sustain a patent.

A patent is invalid if before its priority date the invention has been publicly disclosed in the U.K. either by a prior user or by public description; it is also invalid if the specification is inadequate or ambiguous. A British patent secures to the grantee the exclu-

sive right (in the U.K. only) to manufacture, use, and sell, or to grant licences for these purposes, and an infringer may be restrained and made liable for damages. An infringement action is brought in the high court, usually the chancery division, and the defendant may plead invalidity as well as non-infringement. Unjustifiable threats of patent proceedings can be restrained and damages can be recovered. A patent has effect against the crown; but govt. depts. and their agents may use patented inventions for crown purposes, subject to the payment of compensation. In the absence of a specific agreement between them, joint patentees may each work the invention independently, but cannot independently grant licences. A patent is transferable by deed, and if an agreement to assign is registered before a patent is sealed, the patent will be granted to the assignee. Patents relating to food or medicine are subject to compulsory licence.

In the U.K. an application for letters patent in respect of inventions is made upon forms obtainable at the Patent Office, London, where also the forms which require fees can be stamped. An application may be accompanied by a provisional specification, in which the invention is described, or by a complete specification, in which are particularly described the invention and the manner in which it is to be given practical effect. In the former case, the provisional specification must be followed within twelve months by a complete specification. The lodging of a provisional specification confers no exclusive rights upon an applicant, unless the application is completed later by lodging a complete specification.

A search for novelty among British patent specifications published within 50 yrs. back from the date of the application is prescribed

high court on the above grounds or on certain further grounds.

A specification may, after its acceptance, be amended, either by way of disclaimer, correction, or explanation, provided that the specification, after amendment, does not contain an invention substantially larger or different from the invention claimed before the amendment.

At any time not less than three years after the sealing of a patent, any person may apply for a compulsory licence under a patent on the ground that the protected product or process is manufactured or carried on wholly or largely outside the U.K., or that the invention is not being commercially worked or the public demand is not being met on reasonable terms, or that trade or industry is prejudiced by the unwillingness of the patentee to grant licences or by unfair use of the patent.

The fees payable for a patent are £6, £1 with the application, £4 when lodging the complete specification, and £1 at the time of sealing. No further fees are payable until the expiration of four years from the date of the patent, when the scale of charges becomes £5 for the fifth year, £6 for the sixth year, and so on until the sixteenth year, when £16 is chargeable which covers the rest of the normal life of the patent. By voluntarily having his patent endorsed as subject to compulsory licences (fee £1), a patentee saves half the renewal fees due thereafter. *Consult Compendium of Patents and Designs, Law and Practice, Haddan, 1931.*

PATENT LAW IN THE U.S.A. The first patent law in the U.S.A., enacted in 1790, has been several times revised. The Patent Office, previously a branch of the dept. of the Interior, was transferred in 1925 to the dept. of Commerce. A patent for an invention may be granted to the inventor of any new and useful art, machine, manufacture, or composition of matter, or for any new and useful improvement in these classes. The patent right in an invention lasts for 17 yrs. and in a design for an article of manufacture for 3½, 7, or 14 yrs. as the inventor may elect. An application must be made by the inventor himself. It must consist of a petition, specification, or oath, with a filing fee of \$30 (about £7 10s.). A fee of the same amount is charged for the issue of a patent. The application is officially examined to see if it is complete and in the correct

form, and search is then made to find if the invention is new. If the application is rejected, an appeal may be made to the board of appeals in the Patent Office, and further, if necessary, to the court of customs and patent appeals or, as an alternative, to the district court for the district of Columbia. An "interference proceeding" is instituted by the Patent Office if claims are made by different persons to the same invention. If a patent be infringed the patentee may sue in a federal court for the recovery of damages and for an injunction. A patent may not be used to form a combination in restraint of trade in violation of the anti-trust laws.

Patent Medicine. Term originally describing a medicinal preparation which had been the subject of "letters patent" under the Great Seal. The first tax on medicines was imposed in 1783, and was followed by other measures until 1812, when the Medicine Stamp Act was passed. This placed a duty on patent medicines, the duty being indicated by a stamp on the box or bottle, etc., in which the preparation was sold. The Pharmacy and Medicines Act (g.v.), 1941, abolished both the medicine duties and the medicine vendor's licence; and also made it compulsory to state the constituents of a medicine on the article or its container.

Patent Office. Govt. office under the board of trade, supervising the grant of patents. At its offices, 25, Southampton Buildings W.C.2, is the U.K.'s largest scientific library.

Pater, JEAN BAPTISTE JOSEPH (1695-1736). French painter. Born at Valenciennes, he studied under Watteau in Paris. A slavish follower of his master's manner, without his delicate and refining touch, Pater was received into the Academy in 1728 as a painter of *fêtes galantes*. He died July 25, 1736.

Pater, WALTER HORATIO (1839-94). British critic and essayist. He was born at Shadwell, Aug. 4,



Walter H. Pater,
British critic
Elliott & Fry

1839, the son of a physician of Dutch ancestry, and educated at King's school, Canterbury, and Queen's College, Oxford. He became a fellow of Brasenose College in 1864, and passed most of his life at Oxford, spending his vacations in

travel on the Continent. A visit to Italy in 1865 turned a mind, already under the influence of Ruskin, in the direction of Renaissance art, and inspired a number of essays. These, collected and issued in 1873, obtained wide recognition as *Studies in the History of the Renaissance*.

In 1885 appeared his romance of Marius the Epicurean, an apologia for hedonism in its highest form and the pursuit of beauty. His other publications include *Imaginary Portraits*, 1887; *Plato and Platonism*, 1893; *Greek Studies*, 1895; and appreciations of Wordsworth, Coleridge, Rossetti, and others. A collected edition was published in 1901. Pater strove after a jewelled, polished, and musical prose that should satisfy the most fastidious ear. His matter has stood less well the test of time. He died July 30, 1894. A *Life* by A. C. Benson appeared in 1906, and a study by A. Symonds in 1932.

Paterno. Town of Sicily, in the prov. of Catania. It stands at the foot of Mt. Etna, 13 m. by rly. W.N.W. of Catania. Built on the site of the ancient Hybla Major or Galeatis, celebrated for its honey, it has Greek and Roman remains. Its castle, founded in 1073 by Roger I, has a 14th century keep. It was captured by British troops Aug. 5, 1943, in the Second Great War campaign in Italy. Trade is carried on in oil, wine, and flax.

Pater Noster (Lat., Our Father). Latin name for the Lord's Prayer (g.v.). Hence the word paternoster is sometimes applied to the larger beads of the rosary.

Paternoster Row. London thoroughfare. Known first as Paternoster Lane, it runs W. from Cheapside to Amen Corner, Warwick Lane. It was originally inhabited by the makers of prayer-beads, the dealers in which, known as paternosterers, moved here from St. Paul's Churchyard in the 13th century, and the Row was named after them. The modern Paternoster Row, long celebrated as the home of book publishers, was almost totally destroyed in the fire started by German bombers on Dec. 29, 1940. *See Amen Court.*

Paterson. Township of New South Wales, Australia. It stands on Paterson river, 132 m. by rail N. of Sydney, and is the centre of a dairying and citrus fruit district.

Paterson. City of New Jersey, U.S.A., co. seat of Passaic co., and the state's third largest city. It stands on the Passaic R., 15 m. N.W. of New York, and 13 m. above Newark, and is served by

elys. and canal. The river here makes a descent of 50 ft. in one perpendicular fall, providing water power for numerous industries. Known as the Lyons of America, Paterson is the chief silk centre of the U.S.A. Settled by the Dutch in 1679, it was noted for cotton by 1835, and by 1870 was producing half the nation's silk. The Wright aeronautical plant gives other employment. Paterson became a town-ship in 1831, a city in 1851, and is a bishop's see. Pop. 139,656.

Paterson, ANDREW BARTON (1864-1941). An Australian poet. Born at Narrambla, N.S.W., he was educated at Sydney grammar school and graduated in law from the university. He contributed poetry to the Sydney Bulletin, and was a war correspondent in the Philippines, S. Africa, and China. Having also been a farmer and fought in Egypt throughout the First Great War, he became in 1922 editor of the Sydney Sportsman. He published his first book of verse, *The Man From Snowy River*, in 1895; *Rio Grande's Last Race*, 1902; *Saltbush Bill*, 1917; and a collected edition, 1921. He also wrote novels and short stories, the best being *An Outback Marriage*, 1906; *Three Elephant Power*, 1917; *The Shearer's Colt*, 1936. His reminiscences, *Happy Despatches*, appeared in 1934. Paterson is perhaps the most widely read Australian poet of his time; his work is of primitive type and wins response by its rhythmic attraction, simplicity of ballad form, descriptions of action, and a background which suggests the magic of the Australian bush. He died in Feb., 1941.

Paterson, ROBERT (1715-1801). A Scottish Covenanter, known as Old Mortality. Born near Hawick, April 25, 1715, he was a mason by trade, and spent 40 years travelling round the country, erecting or repairing memorial stones on the graves of martyred Covenanters, leaving his wife and family to shift for themselves. He died Jan. 29, 1801. His eccentric life suggested to Sir Walter Scott the theme of his novel *Old Mortality*.

Paterson, WILLIAM (1658-1719). British financier. Born at Tinwald, Dumfriesshire, April, 1658, he left Scotland about 1685. He tramped through England, living for a time in Bristol, and then made his home in the Bahamas. Returning to England about 1690, he entered business life in London, and in 1694 was affluent enough to found the Bank of Eng-

land, the deed on which his fame rests. Less successful was the Darien scheme for the foundation of a new trading port, which he originated after he had left London for Edinburgh. He sailed to Darien in 1698 and returned with the few survivors. Paterson helped to arrange financial relations between England and Scotland after the union in 1707. He died Jan. 22, 1719, having written a good deal on commerce and finance.

Patesi. Sumerian name for the ruler of a city-state in early Babylonia. It regarded him as the steward of the city-god, in whose name he administered its affairs. The office might be inherited, especially when local rule was strong and autonomous. See *Babylonia*.

Pathan. Name popularly denoting the Iranian peoples of E. Afghanistan and the N.W. frontier prov. of Pakistan. The predominant speech is Pushtu; the harsher dialects are spoken by the aristocratic N. tribes, the softer by the democratic S. tribes. The Pathans number perhaps 3,750,000. The term also denotes the early Mahomedan dynasties and architecture at Delhi (13th-15th cent.). See *Afridi*; *Mohmands*; *Waziri*.

Pathé Frères. Émile, Charles, and Théophile Pathé, French originators of the cinema newsreel. Their business was established in Paris in 1900 as *Compagnie Générale Phonographe, Cinématographe, et Appareils de Précision*, and at first sold gramophones. In 1908 Charles introduced the Pathé Journal, the first newsreel, and the following year presented in London the Pathé Gazette. There are now three separate organizations engaged in making and distributing Pathé newsreels: Pathé Cinéma de Paris, Pathé Pictures of London, and Warner Pathé News of New York.

Pathetic Fallacy. Phrase made by Ruskin in *Modern Painters* to condemn the crediting of nature with human emotion: "All violent feelings . . . produce . . . a falseness in . . . impressions of external things, which I would generally characterise as the 'pathetic fallacy'."

Pathetic Sonata. Composition for the piano by Beethoven, his op. 13, in C minor. It was published in 1799 and dedicated to Prince Lichnowsky. Beethoven's own title was *grand sonate pathétique*. The slow movement has been set as an Anglican chant.

Pathetic Symphony. Popular title, first given by the composer's brother, to Tchaikovsky's

6th symphony, in B minor, op. 74. This favourite work is in four movements, the third being in vigorous *alla marcia*. Tchaikovsky was preoccupied with the workings of inexorable fate, and expressed by brilliant orchestration his sense of melancholy and frustration. It was first performed at St. Petersburg, Oct. 28, 1893, a week before he died.

Pathfinder Force. R.A.F. bomber unit of the Second Great War. Its duty was to find the target and identify it with coloured flares, so that other squadrons could drop their bombs within the illuminated area. Pathfinder Force, which included the best navigators and pilots in the service, and was commanded by Air Vice-Marshal Bennett, first went into operation on Aug. 18, 1942. Aircraft were provided with a gyroscopic sight which automatically gave the flare dropper a correct line on the target, even when taking evasive action at high speed. By the end of 1943, 1,000 bombers at a time were dropping 2,300 tons of bombs in 30 minutes on a target illuminated by the pathfinders.

Pathology (Gr. *pathos*, disease; *logos*, discourse). Science which deals with the causes of disease and the changes produced in the body by it. The investigator uses experimental pathology when he produces a disease in animals and studies its effects. Microscopic investigation of the tissues constitutes histology. The observation of morbid processes in sick persons is termed clinical pathology; the study of changes in diseased tissues is known as morbid anatomy.

Pathos (Gr. *pathein*, to suffer). Quality in life and art which touches the emotions, especially pity and compassion. It is usual to speak of pathos as if it were the antithesis of humour, but its appeal is too subtle to be so easily defined. It has, indeed, such affinities with humour that there is more of pathos in some laughter than in some tears. The extremes of tragedy are too terrible to be pathetic; they rise above or fall below an emotion so essentially gentle and personal. The keynote of pathos is simplicity, an entire immunity from self-consciousness and self-assertion. It is "the sense of tears in mortal things," the other side of beauty, youth, and happiness.

Pathos is as inevitably spontaneous as it is elusive. It must be so unpremeditated that it takes

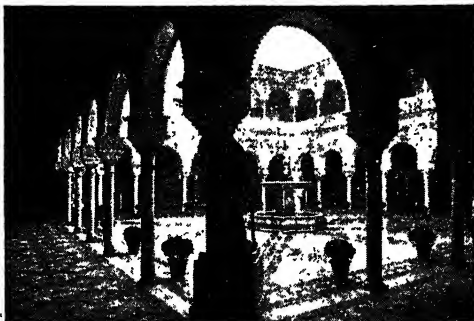
you unawares. It is a wholly artless expression of feeling, and in art must seem so, or it falls from the sublime into the more or less ridiculous.

Patiala. Indian state and town. The former, in the E. Punjab, is the largest of the states in the Patiala and E. Punjab Union (v.i.). At the partition of 1947 it acceded to the dominion of India. It has an area of 5,942 sq. m. and a pop. of 1,936,259. The chief tribesmen are Sikh Jats. The capital is built round the old palace, and is a busy trading centre with some modern buildings. It lies W. of Ambala, with which it has rly. connexion.

Sir Bhupinder Singh, maharaja of Patiala (1891-1938), promoted recruiting in India during the First Great War, represented his country at Geneva, 1925, and at the London conference of 1930, and was chancellor of the chamber of princes, 1926-30 and 1933-36. He was among the keenest cricketers in India. Dying March 23, 1938, he was succeeded by his son, Sir Yadavindra Singh (b. Jan. 7, 1913).

Patiala and East Punjab Union. Federation of Indian states. It was created May 5, 1948, and comprised the states of Patiala, Kapurthala, Jind, Nabha, Faridkot, Malerkotla, Nalagarh, and Kalsia. The union has area 10,000 sq. m. and pop. (1950 est.) 3,320,000, of whom more than one third are Sikhs. See entries under the names of the first six of these states.

Patience. Card game played by a single person. There are many hundreds of such games. In one class the solution depends on pure chance after shuffling the cards. The player continues placing the cards, almost always in ascending or descending sequences of numbers, according to some rule, until all have been grouped, the object being to do this either within a certain number of attempts or after a single deal and lay-out.



Patio, in Spanish domestic architecture. The patio in the House of Pilate, Seville

Patience OR **BUNTHORNE'S BRIDE.** Comic opera by W. S. Gilbert with music by Arthur Sullivan. It was produced at the Opéra Comique, London, April 23, 1881, and transferred to the newly-built Savoy, Oct. 10, 1881, being therefore technically the first of the Savoy operas. In all the piece attained a run of 578 performances. It satirised the fashionable folly that attended the aesthetic movement of the period, but its wit still lives even though that particular form of artistic pretentiousness is dead. Famous songs include *The Magnet* and *the Churn*, *Hey Willow Waly-O*, and the Aesthete's song beginning "If you're anxious for to shine."

Patina. Green coloration seen on bronze or copper articles which have been exposed to a moist atmosphere for a long period. It is imitated by wetting bronze articles with dilute acids, or applying a paint of copper carbonate. Japanese patina is a glossy black with a violet sheen, or golden sheen with shades of red and grey, according to the metal used.

Patino, SIMON (1860-1947). Bolivian magnate. Of Spanish and Indian stock, he was born at Cochabamba in the Andes, and became a clerk in a general store. After acquiring his first mining rights in return for the cancellation of a small debt, he made a vast fortune in tin. At one time his income was estimated at £100,000 a day, exceeding the revenue of the Bolivian government. He became minister in Madrid, and later in Paris. With a fortune estimated at \$75,000,000, Patino died at Buenos Aires, April 30, 1947.

Patio (Lat. *spatium*, space). Spanish word for the courtyard connected with a house. In metallurgy, the patio process is a method of extracting silver from its ores by amalgamation. It is so called from being carried out on the floor of a patio. The ore is brought on to the patio in the state of thick mud, stacked in a heap inside rough walls of clay, and allowed some days to dry. The walls are then taken down and the ore is spread on the floor, mixed with salt and is turned with spades for two or three days, mules being also

kept moving over it. This operation is continued while first a mixture of iron and copper sulphates and then mercury is added until the amalgamation is complete. The mass is then collected and taken to washing boxes in which the slimes are washed away, leaving the silver amalgam behind.

Patkai. Hill range of the Indian sub-continent. It separates Assam from Burma and gives rise to the headwaters of the Chindwin.

Patkul, JOHANN REINHOLD VON (1660-1707). Livonian politician. The son of a Swedish officer, he was born July 27, 1660, in a Stockholm prison, where his parents were incarcerated. Patkul was accused in 1692 of high treason against the Swedish government, and was compelled to leave his country. In 1698 he offered his services to Augustus II of Poland, arranged a coalition against Sweden, and then passed to the service of Peter the Great, on whose behalf he negotiated in 1703 an alliance with Augustus. Later, although a representative of a foreign power, he was arrested, accused by Augustus of double dealing, surrendered to Sweden, and executed Oct. 11, 1707.

Patmore, COVENTRY KERSEY DIGHTON (1823-96). British poet. Born at Woodford, Essex, July 23, 1823, he published a volume of poems in 1844, and was an assistant in the printed book dept. of the British Museum, 1846-66.

He contributed to the leading reviews, and his works include *The Angel in the House*, 1854-62, his most notable poem; *The Unknown Eros*, 1877, a collection of odes; *Amelia*, 1878; *Rod, Root, and Flower*, 1895. A man of difficult temperament, egoist and mystic, he became a Roman Catholic in 1864, and died at Lynton, Nov. 26, 1896. His letters were ed. by B. Champneys, 1900; his life written by E. Gosse, 1905 and D. Patmore, rev. edn. 1949; his poetry evoked studies by O. Burdett, 1921, and F. Page, 1933.

Patmos OR **PATIMA.** Island of the Dodecanese, one of the Sporades group. Lying S.W. of Samos, on the S.E. side of the Aegean, it is famous as the place of banishment of the Apostle John. It became an Italian possession provisionally in



Coventry Patmore, British poet After J. S. Sargent



Patmos. Above the houses is seen the monastery of S. John the Divine, built in 1088

1912 and definitely in 1924, but was transferred in 1947 to Greece. Patmos covers 22 sq. m. Pop. 3,184. See Dodecanese.

Patna. Former Indian state, now merged in Orissa. Administratively it was until 1947 in the Chhatisgarh agency. It has no connexion with Patna in Bihar. It lies between the river Tel on the S.E. and Raipur and Sambalpur on the W. and N., covers 2,530 sq. m., and has a pop. of 632,220. Bolangir was the capital.

Patna. Division and district of Bihar state, India. The div. comprises the three dists. of Shahabad, Gaya, and Patna, and lies S. of the Ganges. It is crossed by the Son, and bounded W. by the Uttar union. Of the dist., practically the whole of the cultivable area is actually growing crops. Area of div., 11,338 sq. m.; pop. 7,265,950. Area of dist., 2,164 sq. m.; pop. 2,162,008.

Patna. City and capital of Bihar state, India. It is situated on the right bank of the Ganges close to the mouths of the three tributaries, Son, Gogra, Gandak. Before the days of rlys. the city was a great trading centre with water transport in five directions. The remains of a pillared hall, erected by the emperor Asoka in the 3rd century B.C., were unearthed in 1912-13. The oldest mosque is that of Sher Shah (1540-45); the Patna Oriental library has a fine collection of Arabic and Persian manuscripts. Here are a university (1917) and a high court. Pop. 175,706.

Paton, JOHN LEWIS (1863-1946). British educationist. Son of J. B. Paton, principal of the Congregational institute, Nottingham, he was born



J. L. Paton, British educationist

member of the consultative committee of the board of Education, and in 1925 was appointed president of the memorial college, S. John's, Newfoundland. He retired in 1933. His biography of his father appeared in 1914. Paton died April 28, 1946.



Patras, Greece. View of part of the town from the harbour

Paton, SIR (JOSEPH) NOEL (1821-1901), Scottish painter. Born at Dunfermline, Dec. 13, 1821, he studied at Edinburgh and London. Successful in the Westminster Hall competitions of 1845 and 1847, he became A.R.S.A. in 1847, and R.S.A. in 1856; and the queen's limner for Scotland in 1866. He painted religious and other subject pictures in the pre-Raphaelite manner, with strong but not always attractive colour. He was at his best in black and white work. Knighted, 1867, he died in Edinburgh, Dec. 26, 1901.

Patos Island. Island in the Gulf of Paria three miles off the Venezuelan coast. Patos, which had been a British possession since 1628, was ceded to Venezuela in 1941, after protracted negotiations. The island has an area of 170 acres, and had a caretaker, who was the sole inhabitant.

Patras. Seaport of Greece. The capital of the department of Achaea, it is in the Morea or Peloponnese. Situated on the slope of a hill overlooking the Gulf of Patras, 13 m. S.W. of Lepanto,

it contains several Jewish synagogues and Greek churches, one of them being traditionally associated with the martyrdom of S. Andrew. The exports include currants, wine, oil, woollen goods, silk, skins, valonia, lemons, honey, and pomegranates. Anciently known as Patrae, it is the only survivor of the 12 cities of Achaea. An early centre of Christianity, it was besieged by the Spaniards in 1532 and 1595. Rebuilt after its destruction by the Turks in 1821, it is now one of the principal Greek ports. During the Second Great War British and Greek regular forces landed here, Oct. 4-5, 1944, without opposition from the Germans, who were by then withdrawing from Greece. There are remains of a Roman aqueduct. Pop. 61,278.

The Gulf of Patras is an inlet of the Ionian Sea, between Hellas and the Morea.

It has a length of 22 m. and a max. width of 14 m. At the Strait of Lepanto, leading to the Gulf of Corinth (q.v.), it narrows to barely 2 m.

Patria potestas (Lat., paternal power). In Roman law, the authority of the head of the household over his own children, or those

adopted by him, irrespective of age. This authority, which normally reduced the children to a condition of life-long dependence, gave the father power over their life and liberty. But it was destroyed by the thrice-repeated sale of a son, the single sale of a daughter, the adoption of a son into another gens or clan, the passing of a daughter into the legal power (*manus*) of a husband, the loss of the rights of citizenship by father or son. The patria potestas was the basis of Roman moral and social strength until Greek influence prevailed.

Patriarch (Gr. *patria*, family; *archein*, to rule). Head of a family or tribe. It is specifically applied to those regarded by the Jews as the fathers of their race, to the presidents of the Sanhedrin, and, after having been adopted by the early Church as the title of the holder of any great see, was given to the bishops of Alexandria, Rome, Antioch, Constantinople, and Jerusalem. One of the titles of the pope is Patriarch of the West; and though the patriarchates of

Constantinople, Jerusalem, Antioch, and Alexandria are sees of the Greek Church, the Holy See continues to appoint bishops to them. These officials, however, except the bishop of Jerusalem, reside in Rome. The title is derived from Acts 7, v. 8. See Archbishop; Exarch.

Patriarchy. Form of social organization under which personal rights, duties, and restrictions are determined from the paternal side. Some social anthropologists prefer the alternative term "father-right." Descent and inheritance may be reckoned along the father's line. The wife may reside with her husband's people, and child-control and choice of mate may be vested in the father. See Family; Matriarchy.

Patricia. District of Ontario, Canada. It is the most N. area in the prov., was formed from parts of Keewatin and the N.W. Territories in 1912, and named in honour of Lady Patricia Ramsay, daughter of the duke of Connaught, then governor-general. The area of the district is 157,400 sq. m. See Canada; Ontario.

Patrician. Member of the ruling order in ancient Rome, as opposed to the plebs or plebeians. They were the descendants of the original citizens, whereas the plebeians were the descendants of those who joined the community later. They had the monopoly of the priestly offices, had the exclusive right of interpreting the law and giving decisions, and alone were eligible for the republican magistracies, while the senate was recruited almost exclusively from their ranks.

A long and bitter struggle was waged by the plebeians (*q.v.*) to break down these privileges. This was at last successful, and from about 300 the patricians survived only as an aristocracy of birth. In the later period of the Roman Empire the dignity was revived as a personal distinction conferred upon eminent personages. In the free cities of the Holy Roman Empire the term was applied to members of families entitled to representation on the council, and was still so used in the 19th century in the Hanseatic towns and some Swiss cantons. See Plebeian; Rome.

Patrick (c. 387–c. 493). Patron saint of Ireland. He was born probably near Dumbarton, Scotland, at Kilpatrick, his father being a Roman named Calpornius, his mother Conchessa being of British origin. Irish raiders carried him into servitude in Antrim at the age

of 16, but, escaping, he became a monk at Tours, was ordained priest by S. Germain of Auxerre, was entrusted by Pope Celestine I with the conversion of Ireland, and went to Wicklow in 433. In spite of hostility, he made his way to Meath, and there met Laoghaire, king of Ireland, at Tara, where he baptized large numbers.

He worked for seven years in Connacht and preached in the other provinces, founding numerous churches, religious houses, and bishoprics. A famous incident recorded of his early labours was the plucking of a shamrock to illustrate the doctrine of the Trinity. Croagh Patrick, at Clew Bay, and the island in Lough Derg, Donegal, were among his places of retreat for meditation and devotion. S. Patrick died at Saul, near Downpatrick, according to some authorities on March 17, 493, though the year is given by the Bollandists as 460. His day is March 17. His literary remains are the valuable Confession, preserved at Dublin, and the letter to Coroticus. There are Lives by J. H. Todd, 1864; J. B. Bury, 1905; W. M. Letts, 1932.

Patrington. Town of the E. Riding of Yorkshire, England. It is 14 m. by rly. S.E. of Hull, and has a trade in seed, corn, and coal. The notable Decorated church has a central spire. Pop. 1,100.

Patriotic Fund. General term for funds raised by public subscription for the relief of sailors and soldiers wounded in war, and their dependants. In the 19th century several such funds were started, the first being that connected with Lloyd's, 1803–26, when over £600,000 was raised. The Crimean War fund touched nearly £1,500,000. Charges of maladministration being made, an Act of 1903 established the Royal Patriotic Fund Corporation, to which the assets were transferred. Funds are administered to benefit dependants of deceased officers, non-commissioned officers, sailors, soldiers, marines, and airmen. There is a Royal Victoria Patriotic school at Wandsworth, for orphaned daughters of servicemen. The office is at 28, Sackville Street, London, W.1. See War Charity.

Patripassians (Lat. *pater passus*, suffering Father). Followers of an early form of the heresy known as Sabellianism (*q.v.*). It arose in the 2nd century, and its main contention was that God the Father became man, and died on the Cross, and that Christ, so far as He was flesh, was Son, and, so far

as He was spirit or God, was the Father. Patripassianism was a development of Monarchianism (*q.v.*).

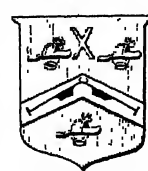
Patron (Lat. *patronus*, from *pater*, father). Originally, a Roman citizen who had freed or manumitted a slave, the term expressing the new relation between master and freedman. The patron by the act of manumission did not lose all rights over his former slave, who owed him the obedience of a son. In addition, patron and freedman were under mutual obligations of a stringent character. From this arose the practice among the impetuous of seeking the favour of an influential man whose clients or dependants they became, and who accepted the title of patron.

Belief in the protection of the saints brought the practice of adopting particular saints as patrons of churches, guilds, etc., as well as of individuals.

Patronage. Literally, that which a patron can give, a favour of some kind. Patronage is of two chief kinds. The right to bestow benefices in the Church of England is known as patronage, whether it is exercised by bishops or laymen. Political patronage, i.e. the right to appoint persons to offices of state, is much less extensive than it was formerly, but it appertains to most rulers and ministers of state. In the U.K. the existing office of patronage secretary to the Treasury is a reminder of its past importance. See Benefice; Ecclesiastical Law.

Patten (Fr. *patin*, clog). Wooden shoe or clog with an iron ring or thick sole to raise the foot out of the mud. Pattens were worn in the 15th century for cleanly walking in the badly kept streets, and survived as chopines through two centuries. See Boots, col. plate.

Pattenmakers' Company, THE. London city livery company. Its origin was a fellowship of clog-



Pattenmakers' Company arms

makers which flourished in the 15th century. The church of S. Margaret Pattens, Eastcheap, is said to mark the old centre of the industry. The Pattenmakers were first incorporated by charter, Aug. 2, 1670. Their office is at 14, King William Street, E.C.4.

Patteson, JOHN COLERIDGE (1827–71). British missionary. Born in London, April 1, 1827, son of a judge, and educated at Eton and Balliol, Oxford, he was ordained



John C. Patteson,
British missionary

he was murdered, Sept. 20, 1871, on Nukupu, having been mistaken for a slave-dealer. *Consult* Lives, C. M. Yonge, 1898; F. H. L. Paton, 1930.

Patti, ADELINA JUAÑA MARIA (1843-1919). Anglo-Italian singer. Born at Madrid, Feb. 19, 1843, she made her operatic début as Lucia in 1859 in New York, where her parents, Italian musicians, had gone to reside. In 1861 she sang with great success in London as Amina in *La Sonnambula*, and afterwards visited the chief cities of Europe. Madame Patti was for long the most popular soprano in England, probably in the world, and is held by many to have been the greatest who ever performed. Her series of farewell concerts in London lasted from 1895 to 1908. She was thrice married, her third husband being a Swede, Baron Cederström, who owned Craig-y-Nos Castle, Brecon. She died Sept. 27, 1919. Buried first in England, her body was exhumed and interred in Père Lachaise, Paris. Craig-y-Nos Castle is now a sanatorium, for which it was bought in 1924.



Adelina Patti,
Anglo-Italian singer

Pattison, DOROTHY WYNDLOW (1832-78). British philanthropist, known as Sister Dora. Born at Hauxwell, Yorks, Jan. 16, 1832, she was a daughter of the rector and the youngest sister of Mark Pattison (v.i.). In 1864 she joined the sisterhood of the Good Samaritan at Coatham, and in 1865 took charge of a hospital conducted by that community at Walsall. In 1877, during an epidemic of small-pox, she became superintendent of the Walsall municipal hospital. She died Dec. 24, 1878. A statue was erected in Walsall to her memory. *Consult* Sister Dora, M. Lonsdale, 1880.

Pattison, MARK (1813-84). British scholar. Born Oct. 10, 1813, at Hornby, Yorks, he was

educated at Oriel College, Oxford. He associated during his early years with Newman, but later became more liberal in his views. In 1839 he was elected a fellow of Lincoln College, being ordained in 1841. In 1855 he resigned his tutorship, but returned to Oxford in 1861 as rector of Lincoln, remaining there until his death at Harrogate, July 30, 1884. His widow, Emilia Francis Strong, married Sir C. W. Dilke (q.v.).

Pattison wrote lives of Casaubon and Milton, and contributed to *Essays and Reviews* (q.v.). His *Memoirs*, published posthumously in 1885, are almost painful in their frankness; he is sometimes bitter towards others, and always hard on himself. *Consult* *Recollections of Pattison*, L. A. Tollemache, 1891.

Patton, GEORGE SMITH (1885-1945). American soldier. He was born at San Gabriel, Calif., Nov. 11, 1885, and graduated from West Point in 1909. He was aide-de-camp to Gen. Pershing, 1916-17, later commanding a tank brigade. Commanding general, the 1st armoured corps in 1941, he was at



Mark Pattison,
British scholar

because of his outspoken political opinions. He died at Heidelberg on Dec. 21, after a motoring accident. He wrote *War as I Knew It*, pub. posth. 1948. *Consult* *The Man in a Helmet*, J. Wellard, 1947.

Pau. Town of France. The capital of the dept. of Basses-Pyrénées, it stands on the right bank of the Gave du Pau, 66 m. E.S.E. of Bayonne. The chief building is the castle, built in the 14th century by Gaston Phoebus, count of Foix; later it was enlarged, and it was restored by Louis Philippe, although part is still a ruin. It has a noted collection of tapestries. Other buildings include the hôtel de ville, an old Jesuit college, and a museum. In the Place Royale is a statue of Henry IV. Standing at a height of 670 ft., with a delightful climate, Pau is a favourite winter resort. It was the residence of the counts of Foix, while during 1512-89 it was the capital of the little state of Béarn. Henry IV and Marshal Bernadotte were born here. Pop. 46,158.

Paul. Urban dist. of Cornwall, England. It is 2 m. S. of Penzance. The chief building is the church of S. Paul and the main industry is fishing. The Spaniards burned the village in 1593. Near by are remains of a British camp. Pop. 5,813.

Paul. Masculine Christian name. Of Roman origin, it is a



Pau, France. View from the left bank of the Gave, showing the 14th century castle

the head of the western task force when the Allies landed in N. Africa. Lieut.-gen. in 1943, he led the 7th army through the Sicilian campaign. In W. Europe, Patton commanded the U.S. 3rd army, formed Aug. 1, 1944, which cut off the Cotentin pen. and liberated Paris in what was virtually a continuous drive from Normandy to the Siegfried Line, where he was halted by difficulties of supply. He helped to restore the situation in the Ardennes after the German break-through. In 1945 Patton was appointed military governor of Bavaria, but was transferred to the command of the 15th army

contraction of Paucillus, and means small. It became popular throughout Christendom because borne by S. Paul. The form Paulus is sometimes used; Paula, Pauline, Paulina and Paulette are feminine.

Paul. Christian apostle and saint. He was born at Tarsus, Cilicia, about the same time as Jesus Christ was born in Judea. He was originally called Saul, the change being mentioned without explanation in the account of his first missionary journey. He was a Jew of the Dispersion, who had learnt the trade of a tent-maker in Tarsus, a city which specialised in the manufacture of

haircloth. Sent to Jerusalem to train as a rabbi, he studied "at the feet of Gamaliel," but did not absorb that great scholar's tolerant spirit. After the Resurrection he became one of the leading opponents of the followers of Christ, and headed a persecution intended to suppress them, being present at the martyrdom of Stephen. But on his way to Damascus, to further the persecutions, he was converted by a vision of Christ to the faith he was attempting to destroy.

After three years of meditation in Arabia, he went to Jerusalem. The confidence of the disciples was won for him by Barnabas, and he began to preach with great power. The opposition of the Jews was too strong, and he had to move to Tarsus, where he spent some years (of which there is little record) in evangelising his native province. Then Barnabas, whose work at Antioch was proving successful, summoned his help there. Thence he set forth on his first missionary journey, made in a circle round Cilicia. This was attended with great difficulties and astonishing success; but his second mission was by far the most adventurous and influential, carrying the Gospel into Europe, and evangelising the cities of Greece, including Athens and Corinth. For the third journey, covering the same ground, the chief centre was Ephesus.

His aspiration now was to preach the Gospel in Rome, and this hope was fulfilled, though in an unexpected way. Arriving in Jerusalem after his third journey, he was arrested at the instance of the Jews. As a Roman citizen by birth he appealed to Caesar, and therefore had to be sent to Rome for trial before the emperor. On his way he suffered long imprisonment at Caesarea, and at Rome he waited two years for trial. But from prison he kept up ceaseless communication with the churches he had founded all over the Empire. He sent them letters, now known as the Epistles, and received letters from them; their leaders visited him, and his helpers visited them.

It has been questioned whether he was ever freed, but the probability is strong that he was. The two Epistles to Timothy and that to Titus appear to belong to the period after his first Roman imprisonment, and contain mentions of visits to such places as Ephesus and Crete. In the second Epistle to Timothy, written from prison in Rome, he is expecting

not release, but the speedy ending of his course. At Three Fountains, a spot to the S. of Rome, is shown the traditional scene of his beheading.

At the outset of Paul's Christian career, he strongly maintained against the opinion of the Jewish church, as well as of Peter, James, Barnabas, and other associates, the right of Gentiles to full communion in the Church without submission to the Jewish law, and thereby laid the foundation of Christianity as a world religion rather than a Jewish sect. For this, and for his great missionary zeal, he has been called the second founder of Christianity. He occupies a lofty place among both thinkers and men of action. Through faith and love he felt himself one with Christ; and in his own personality it seemed to him that Christ continued to act and suffer. Justification by faith, union with Christ, and the universality of the Gospel became the watchwords of his life and he never wavered from his proclamation of them in phrases that have become part of the everyday consciousness of the Christian world. See Acts of the Apostles; Christianity; Church; and under the various Epistles, e.g. Galatians.

Bibliography. Life and work of S. Paul, F. W. Farrar, rev. ed. 1902; The Religions of S. Paul, P. Gardner, 1911; Studies of S. Paul and His Gospel, A. E. Garvie, 1911; The Meaning of S. Paul for Today, C. H. Dodd, 1920; The Religion of Jesus and the Faith of S. Paul, A. Deissman, 1923; Paul of Tarsus, T. R. Glover, 1925; Christianity according to S. Paul, C. A. Scott, 1927; The Gospel of S. Paul, S. Cave, 1928; Beyond Damascus, F. A. Spencer, 1935; S. Paul, the Traveller and Roman Citizen, W. M. Ramsay, 1942.

Paul. Name of five popes. Paul I succeeded his brother Stephen II in May, 757. He associated himself with the Frankish king Pepin, and entered into friendly relations with the emperor of the East. He died June 28, 767.

Paul II (1417-71). Pope from 1464 to 1471. A Venetian and the nephew of Eugenius IV, Pietro



Paul II,
Pope 1464-71

Barbo abandoned a secular career on the elevation of his uncle to the papal throne (1431). He was created cardinal in 1440, and was elected pope in suc-

cession to Pius II. As Paul II he instituted the carnival at Rome, built the palace now known as the Palazzo di Venezia, and was a patron of the arts. He died July 26, 1471.

Paul III (1468-1549). Pope from 1534 to 1549. Born Feb. 29, 1468, of an ancient Roman family,



Paul III,
Pope 1534-1549

Alessandro Farnese studied first at Rome and afterwards at Florence, where his association with the court of the Medici laid the foundations of his career. He was made cardinal in 1493 by Alexander VI, and increased in favour under successive popes. On his election to the papacy he was bishop of Ostia. His pontificate coincided with the Counter-Reformation.

He afforded material assistance to the emperor in his struggle against the Protestant princes of the Schmalkalden League, but Charles V's methods of compromise created a breach between them which was never healed. The general council met at Trent in December, 1545, but an outbreak of the plague led to its adjournment to Bologna, and subsequently, as a result of the emperor's demand for its return to German territory, the pope indefinitely suspended its meetings. He died Nov. 10, 1549.

Paul IV (1476-1559). Pope from 1555 to 1559. Born near Benevento, June 28, 1476, a member of the Caraffa family, Giovanni



Paul IV,
Pope 1555-59

Pietro was ordained, and in 1524 resigned his benefices to enter a religious order founded by S. Cajetan. Picked out by Paul III for the work of reform, Caraffa was in 1536 made cardinal, and afterwards archbishop of Naples. He was elected pope in his 80th year. The chief feature of Paul IV's pontificate was an implacable opposition to Spain, which prompted his war with Philip II, his alliance with France, and the enrichment of his worthless nephews with possessions taken from the Colonna family, who supported the Spanish interest. He reorganized the Inquisition, before which he caused to be

summoned even eminent clerics, on the bare suspicion of heresy. Paul IV died Aug. 18, 1559.

Paul V (1552-1621). Pope from 1605 to 1621. Born at Rome, Sept. 17, 1552, Camillo, a member of the



Paul V,
Pope 1605-21

noble Borg-hese family, studied law at Perugia and Padua. He was created cardinal by Clement VIII in 1596, and elected pope in succession to Leo XI.

The chief event of his reign was his quarrel with Venice. In England the pope forbade Catholic subjects to take the oath of allegiance demanded by James I. He died Jan. 28, 1621. See Life, T. A. Trollope, 1861; History of the Papacy, M. Creighton, 1903; History of the Popes, L. v. Pastor, Eng. trans. F. I. Antrobus, 1891-1912.

Paul I (1754-1801). Tsar of Russia. He was born Oct. 1, 1754, the son of Catherine the Great and Peter III, who had such an aversion for him that he refused to acknowledge him. After the murder of Peter in 1762 Catherine seized the throne, and Paul led an obscure existence until her death. Paul began his reign by banishing the counsellors of Catherine. He joined the allied powers against Napoleon, and later entered into an alliance with Napoleon in order to crush the Bourbons. On March 23, 1801, he was assassinated.



Paul I,
Tsar of Russia

Paul I (b. 1901). King of the Hellenes. The younger brother of George II, he was born at Athens, Dec. 14, 1901, and joined the Greek navy. He lived much in England. He was a qualified air pilot, and trained as a parachutist. In 1938 he married Princess Frederica of



Paul I,
King of the Hellenes

Brunswick, a descendant of Queen Victoria. They have a son, Constantine, and two daughters. He succeeded to the throne on the death of his brother, April 1, 1947.

Paul. Prince of Yugoslavia. The son of Prince Arsène and grandson of Alexander Kara-Georgevitch, prince of Serbia 1842-1859, Prince Paul was born in St. Petersburg (Leningrad), April 28, 1893. He studied at Oxford and lived for some time in England. When Alexander I of Yugoslavia was assassinated, Oct., 1934, Paul became head of a council of regency, King Peter (q.v.) being a minor. The dictatorship imposed by Alexander I was still in force, and, while he maintained it, he showed himself in sympathy with liberal elements and with the demands of the Croats. In March, 1941, popular indignation against his signing of an agreement with the Tripartite powers led to a *coup d'état*. On March 27, 1941, Peter assumed power, Paul resigned the regency, and fled with his family to Athens. On Jan. 2, 1942, when he was in Kenya, the Yugoslav government in London annulled his membership of the royal family. But he was included among those members of the royal household who under a decree issued Mar. 9, 1947, were deprived of Yugoslav citizenship.



Paul,
Prince of Yugoslavia

Paul of Samosata. Third century heretic. Born at Samosata, on the Euphrates, he was appointed bishop of Antioch about 260. He was condemned for heresy by the council of Antioch in 264, and was deposed from his bishopric five years later. But the influence of Zenobia of Palmyra maintained him in his position till 272. He taught that the Word was not made flesh, but merely manifested itself in Christ without making Him divine. In his view, the Trinity was merely a triple form of manifestation of God.

Paul-Boncour, JOSEPH (b. 1873). French statesman. Born Aug. 4, 1873, at St. Aignan-sur-Cher, he became a barrister, and was a member of the Waldeck-Rousseau cabinet of 1899 and the Viviani cabinet of 1906-09. He sat first as an independent Republican Socialist deputy, but joined the Socialists in 1911, in which year he was minister of Labour under Monis. After 1919 he became a prominent leader of the Socialist, and after 1931 of the Radical-Socialist party. In 1932

he became minister of war under Herriot. When Herriot refused to sanction repudiation of the French debt to the U.S.A., he succeeded him as premier, Dec., 1932, but resigned the next month. He held the foreign affairs portfolio in the Daladier, Sarraut, and Chautemps governments, 1933-34, attending the world economic conference, June, 1933, and signing the Franco-Russian trade agreement, Jan., 1934. He had been a delegate to the League of Nations from 1924 to 1926, and in 1932 was appointed permanent French delegate there, returning to France on his appointment as minister of state for League affairs, Jan., 1936. He resigned this post six months later. For a time he was out of politics, but returned after the Second Great War, representing France at the United Nations Assembly.

Paul et Virginie. Story by Bernardin de Saint-Pierre. It was first published in 1789 as one of his Studies of Nature. The scene is laid in the island of Mauritius, and the story is of the great affection of the hero and heroine—somewhat conventionalised “children of nature.” The tragic tale is one of the classics of sentimentalism.

Paulet or Poulett. Famous English family, the heads of which are the marquess of Winchester and Earl Poulett. Its earliest members came apparently from the village of Pawlett, near Bridgwater, and one of them, Sir Amyas Poulett, was knighted in 1487. A later Sir Amyas was gaoler of Mary Queen of Scots, and others were noted soldiers.

In 1551 Sir William Paulet was made marquess of Winchester, and in 1689 the 5th marquess was created duke of Bolton. The latter title became extinct when the 6th duke died in 1794, but the marquessate passed to another branch of the Paulets. In 1627 John Poulett, a descendant of Sir Amyas, was made Lord Poulett of Hinton. John, the 4th lord, was made Earl Poulett in 1706, and in 1710-11 was first lord of the treasury and nominal head of a Tory ministry.

Pauli, WOLFGANG (b. 1900). Austrian physicist. Born in Vienna, April 25, 1900, he was educated at the university, and in 1921 was appointed assistant physicist at Göttingen. In 1922 he went to Copenhagen university as a pupil of Bohr (q.v.). Having taught physics in turn at the universities of Hamburg and Zürich, he went in 1935 to the U.S.A., becoming visiting professor of theo-

retical physics at Princeton, and in 1938 lecturer at Michigan university. In 1940 he returned to Princeton, and in 1945 was awarded the Nobel prize for research in the development of atomic energy.

Paulicians. Heretical sect which arose in Syria about 660, under the teaching of Constantine of Mananalis, who assumed the name of Sylvanus. They are variously said to have been named after S. Paul, whose teaching they professed to follow, and after a certain Paul who is said to have preached Manichaean doctrines in Armenia. While they repudiated the alleged apostleship of Mani, they adopted his doctrines of the essential evil of matter and the dualistic origin of the universe. They denied the inspiration of the O.T., and rejected the doctrine of the Atonement. They also repudiated the sacraments.

The Paulicians were constantly persecuted from the 7th till the middle of the 9th century, when they leagued themselves with the Saracens and revolted against the emperor. Finally they were defeated, but continued to give trouble; and early in the 10th century they became powerful in Bulgaria, where their teaching had spread widely. At the close of the 11th century they were scattered by Alexius Comnenus.

Paulinus. English prelate. Born in Rome, he became a monk, and in 601 was one of those sent to England by Pope Gregory I to assist S. Augustine. After working in Kent he went in 625 to Northumbria, where in 627 he baptized the king, Edwin, and became the first bishop of York. After the death of Edwin in 633, he returned to Kent and became bishop of Rochester.

Paulinus, GAIUS SUTONIUS. Roman general. In A.D. 41 he suppressed a revolt in Mauritania, thus extending the Roman power to the base of the Atlas Mountains. In 59 he was appointed governor of Britain, and two years later subdued Anglesey, the stronghold of Druidism. Summoned south to quell the Iceni, who had rebelled under the leadership of their queen, Boadicea (q.v.), Paulinus gained a decisive victory over them near London. The following year he was recalled to Rome, and in 66 was consul. After the death of Galba, he served under Otho, and in 69 was defeated by Vitellius.

Paulistas. Descendants of the first Portuguese settlers in Brazil. Settled mostly round São Paulo,

whence their name, they formed a vigorous and progressive race who opposed with equal energy Indians, Spaniards, and Jesuit missionaries, and successfully opened the country for Portugal as far as the Andes.

Paul Jones. Popular ballroom dance feature, in which partners and tempi are frequently changed. It is named after the sailor, of whose life details will be found under Jones, John Paul.

Paulownia (*Paulownia imperialis*). Tree of the family Scrophulariaceae. It is a native of Japan. It has large opposite, downy leaves and tubular, violet flowers with darker spots, in elongated clusters at the ends of the shoots.

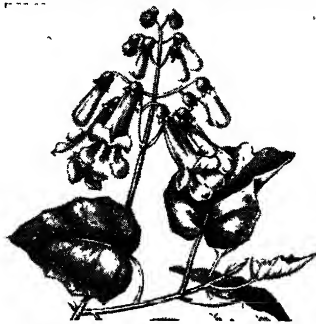
Paul Pry. Character of a three-act comedy of the same name by John Poole, produced at the Haymarket Theatre, London, Sept. 13, 1825. An inquisitive gossip, he tries to learn all about other people's business by eavesdropping or appearing with the half apologetic "I hope I don't intrude," which came to be a catch phrase. The creator of the part was Liston, and later it was often played by Toole. Paul Pry is also the title of a two-act comedy by Douglas Jerrold, produced at the Coburg Theatre, Nov. 27, 1826.



Paul Pry, as acted by John Liston
After G. Clint. A.R.A.

Paulus, FRIEDRICH VON (b. 1890). German soldier. Born at Breitenau, Hesse, he served in the First Great War with an infantry commission and on the staff. After 1933 he was engaged in the development of German armoured forces. He was chief of staff to Reichenau in the campaign against Poland, 1939, and subsequently with the rank of lieutenant-general supervised the training of armies for Russia. Promoted to colonel-general in 1942, he distinguished himself at Kharkov and commanded the 6th Army at Stalingrad, but his forces were surrounded in the Russian counter-offensive of Nov., and he was taken prisoner Jan. 31, 1943,

with his entire staff. He had just been promoted field-marshal. Paulus published a statement on



Paulownia. Leaves and cluster of tubular flowers

behalf of the council of free Germans in Russia, Aug. 8, 1944, and on Nov. 14 broadcast a denunciation of the Nazis and an appeal to the Germans to end the war. After the war he remained in Russia.

Paulus, LUCIUS (OR MARCUS) AEMILIUS. Roman general. Consul in 219 B.C., he was awarded the honour of a triumph for his victory over Demetrius of Pharos, an Illyrian general who had carried on piratical expeditions in forbidden waters, contrary to treaty conditions. Again consul in 216, he lost his life at the battle of Cannae, fought on Aug. 2 against his advice, refusing to leave the field after the defeat of the Romans.

Paulus, LUCIUS AEMILIUS (c. 229-160 B.C.). Roman general. The son of the above Lucius Paulus, he received the surname of Macedonicus from his defeat of Perseus, the last king of Macedonia, at Pydna in 168 B.C. He was one of the best types of the old republican nobility. His son was adopted into the family of Scipio and became known as Scipio Africanus Minor.

Paulus Diaconus OR PAUL THE DEACON. Medieval historian. By birth a Lombard, he was born about 725, and became a member of the court of the Lombard king. Later he entered a monastery, and became a deacon, dying before 800 at Monte Cassino, a Benedictine abbey where he had lived for some time. He was known to Charlemagne, and was one of those who helped in the 8th century revival of learning. The reputation of Paulus rests on his History of the Lombards. A Latin chronicle, it tells the story of the Lombards down to 747, and about the relations between the Franks and the Lombards is the most valuable authority extant. Other writers con-

tinued it. It was first printed in 1514, and has been translated into English and other languages.

Pauperism (Lat. *pauper*, a poor person). State of dependence upon the community through lack of the ordinary means of subsistence. As long ago as in the time of ancient Greece the maintenance of the poor was a matter of state concern. The sale of grain to the poor at low prices, and ultimately its free distribution, marked the decadence of the Roman empire and contributed to its downfall. Feudalism involved the dependence of the serf upon his lord for maintenance, and the Church became throughout the Middle Ages the greatest almsgiver. When the monasteries fell, the poor suffered, but in England vagabondage had been a crying evil long before this. Repressive measures had been tried in vain. Compulsory contributions for the support of the poor began in England in 1535, the duty of relief being put on the parish. A law of 1801, by taxing every parishioner for the relief of the poor in his parish, formed the basis of the English poor law system. See Poor Laws.

Pausanias. Spartan general. After the death of his father Cleombrotus (480 B.C.), he acted as regent for Pleistarchus, the son of Leonidas, and hence is sometimes erroneously called king of Sparta. In 479 he was appointed to the command of the combined Greek force which defeated the Persians at Plataea (q.v.). He then captured Byzantium, whence the Persians threatened the Aegean Sea, but, impressed with the magnificence of the Persian empire, made overtures to Xerxes, offering to assist in the subjugation of Greece, and asking the hand of his daughter. Xerxes received these overtures favourably, and Pausanias began to treat the representatives of the allied states with such arrogance that they transferred their allegiance from Sparta to Athens.

Meanwhile suspicion had been aroused, Pausanias was recalled to Sparta, and twice stood his trial for treason. He was acquitted on each occasion, but an intercepted letter to the Persian monarch placed his guilt beyond doubt. After an unsuccessful attempt to provoke a Helot revolt, Pausanias took refuge in a temple, which was walled up with a view to starving him to death. At the last moment, in order that the sacred place might not be polluted by death, he was brought out, and expired. c. 471.

Pausanias (c. A.D. 150). Greek traveller and geographer. Perhaps a native of Lydia, he travelled extensively in Greece, embodying the results of his journeys in a work in 10 volumes, *The Itinerary of Greece*. Modern research largely confirms the accuracy of the *Itinerary*. Pausanias travelled also in Egypt, Syria, Palestine, and Italy.

Pause. In music, a sign placed over a note or rest to indicate that it is to be sustained *ad libitum* beyond its written value. It is also used for a rest.

Pavane (Ital. *pavano*, from Lat. *pavo*, peacock). Stately dance tune in duple time, joining with the galliard in the earliest kind of suite. Thomas Morley, in *A Plaine and easie Introduction to Practicall Musicke*, 1597, wrote of the Pavane as "a kind of staide musicke, ordained for grave dauncing . . . everie straine is plaid or sung twice. A straine they make to contain 8, 12, or 16 semibreves as they list, yet fewer than eight I have not seene in any pavan. . . . After everie pavan we usually set a galliard." Modern examples have been composed by Fauré and Ravel.

Pavia. Prov. of N. Italy, in Lombardy. It is bounded N. by Milan, N.W. by Novara, S.W. by Alessandria, and S.E. by Piacenza. Mountainous in the S., it stretches N.W. from the Ligurian Apennines to the valley of the river Po. Fertile tracts in the N. and centre are watered by the Ticino, Sesia, and other tributaries of the Po. There are many canals, the chief linking up the Ticino with the Olona. Area, 1,287 sq. m. Pop. est. 500,000.

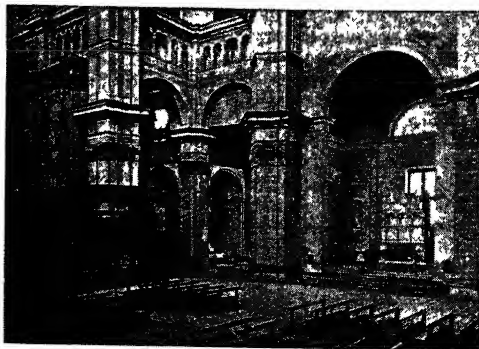
Pavia. City of Italy. The capital of the prov. of Pavia, it is the ancient Ticinum. It stands on the left bank of the Ticino, near its junction with the Po, 22 m. by rly. S. of Milan. A magnificent 14th century covered bridge spanned the river, but was severely damaged in an air raid, Sept. 5, 1944. The cathedral was founded in 1487 and the façade finished in 1898. S. Michele, one of the finest specimens of the Lombard basilica, dates from the 11th century. In it some of the

medieval emperors were crowned kings of the Lombards. The original church, which was in existence as early as 661, was burned down in 1004; its successor was restored in 1863-76.

The university is a handsome building dating from 1490, but Pavia was a centre of learning by the 9th century. Attached to the modern edifice is a well-stocked library and a botanic garden. The Palazzo Malaspina houses a collection of paintings, engravings, and historical relics. The Castello, built by Galeazzo Visconti about 1360, is a huge rectangle with arcades, which formerly contained a priceless collection of armour and antiquarian relics; it was looted by the French in 1500, and was long used as a barracks. Near by is the Certosa di Pavia. Manufactures are unimportant, but there is trade in silk, wine, olives and olive oil, corn, hemp, and Parmesan cheese. Pop. 51,741.

Founded by Gauls, Pavia was the capital of the kingdom of the Lombards until 774, when it was captured by Charlemagne. It fell into the hands of the Visconti in the 14th century, and thereafter shared in the fortunes of Milan. It was sacked three times by the French, and occupied by Austria in 1706, 1746, and 1814, and retained by them until 1859, when it became Italian. See Certosa.

Pavia, BATTLE OF. Victory of Charles V over the French, Feb. 24, 1525. After a protracted siege of the city of Pavia by Francis I of France, an imperial army was collected for its relief and the battle opened without the city walls. The day was going in favour of the French when their Swiss mercenaries deserted in a body. Troops emerged from the city and took the French in the rear, and after a bloody contest the latter were routed with a loss



Pavia, Italy. Part of nave and pulpit of the cathedral

of 10,000 men, Francis himself being taken prisoner. The battle ended the French invasion of Italy.

Pavilion. Word derived indirectly from Lat. *papilio* (butterfly) and used at first for a tent of a rather elaborate kind. It was given to the temporary erections at tournaments and festivities, e.g. at the Field of the Cloth of Gold, 1520. Today it is chiefly used for a building attached to a sports or recreation ground.

Paving. Surface covering of path, yard, terrace, court, or street. Solid interior floorings are also sometimes termed pavings. Early pavings were of cobble stones and paving stones (flags) laid on earth. Stone flags are now laid on sand, fine ashes, or concrete. They are usually bedded in mortar. Pre-cast concrete slabs are now often used, or bricks laid on edge are bedded and jointed in cement mortar on a concrete foundation. Concrete, sometimes reinforced, poured on a prepared ground surface is widely used for paving paths, yards, and roads. Temporary wood or steel edge forms are fixed with pegs and a screeding board is moved over these edges to finish the concrete surface. Expansion joints are spaced at intervals of from 15 to 30 ft. To give a hard wearing surface the top inch or two of concrete may incorporate small granite chippings in a mix called granolithic.

Quarry tiles or burnt clay laid on concrete are sometimes used for paving terraces and verandas. Concrete tiles incorporating aggregates of coloured stone and marble are likewise used. Tarmacadam, a mixture of tar or bitumen and stone chippings, is also frequently used for paths, pavements, and roads, or asphalt (coloured for ornamental purposes) may be utilised, laid either on concrete or well rolled ballast.

While similar materials may be used for interior pavings, the principal materials are granolithic; quarry tiles; black, white, and coloured clay tiles; terrazzo and marble mosaic; marble slabs; jointless composition. These are all laid on a concrete foundation.

Granite setts and wood blocks, once widely used for street paving, are not now favoured, because they are responsible for excessive traffic noise and for wheel skids when the surface is wet.

Paviors' or Pavioours' Company, THE. London city livery company. Referred to in Strype's Stow, ed. 1755, as "no doubt a



Paviors' Company arms

130, Mount St., W.I. See An Account of the . . . Pavioours, C. Welch, 1909.

Pavlograd. Town of Ukraine S.S.R. It is 40 m. E. of Dniepropetrovsk, on the river Volocha, and the Kursk-Sevastopol rly. Here have been numerous flour mills, tobacco and brick works, and considerable trade in grain and cattle. Captured by German forces in Oct., 1941, Pavlograd was retaken by Russian troops on Feb. 20, 1943. A German counter-attack forced the Russians to leave again on March 9; but the Germans were finally driven out on Sept. 19. Pop. est. 50,000.

Pavlov, IVAN PETROVITCH (1849-1936). Russian physiologist. Son of a village priest in Ryazan, he was born Sept. 27, 1849, and educated at a theological seminary and St. Petersburg (Leningrad) university. He qualified as a doctor in Germany. Appointed director of physiological studies at the medical institute of St. Petersburg in 1890, he was professor 1897, and in 1907 was one of four scientific members of the academy. A series of papers on digestion, written over many years, won him a Nobel prize in 1904. After the Revolution he became director of the academy of medicine. His work on the nervous system increased his fame and he was acclaimed, particularly by the Behaviourist school of psychology in the U.S.A., among the most brilliant of modern scientists.

Pavlov is most widely known for his experiments on the reflexes of animals, which proved that reflex action could be conditioned by stimuli other than that which normally called it forth. Dogs, subjected for a period to the stimulus of a ringing bell every time they were fed, eventually salivated when the bell was rung alone. In 1934 the Soviet government gave Pavlov 1,000,000 roubles for the



Ivan Pavlov, Russian physiologist

company of antiquity," but without any record of incorporation, and by Maitland in 1739 as a company by prescription, this guild was reconstructed in 1889. The office is at

extension of his laboratories, and an annual pension of 20,000 roubles. He died Feb. 27, 1936.

Pavlova, ANNA (1885-1931). Russian dancer. Born at St. Petersburg (Leningrad), Jan. 31, 1885, she trained at the imperial ballet school there, and became prima ballerina at the Marinsky Theatre. She made her London debut at the Palace Theatre in 1910, dancing with Mordkin in *Les Papillons* and *Valse Caprice*. She appeared with Diaghilev's company in Paris, but love of tradition and classicism resulted in her dissociating herself from contemporary ballet, and forming her own company. In such dances as *Le Cygne*, probably her most famous piece, her genius was realized to the full. Pavlova was a supreme exponent of the classic manner; her magnificent virtuosity was matched only by grace and exquisite sense of style. She carried out world tours and frequently went to the U.S.A., though she made her permanent home at Hampstead. She died Jan. 22, 1931. *Consult* Anna Pavlova, by her husband, V. Dandré, 1932; also Pavlova, the Genius of the Dance, W. Hyden, 1931.



Anna Pavlova, Russian dancer

Pavlovo. Tn. of the R.S.F.S.R. in Gorky region, 45 m. by rly. S.W. of Gorky, on the river Oka. Long one of the most important industrial centres of Russia, it has been called the Russian Sheffield. There are factories of locks, knives, and ironware, also soapworks.

Pavo or Peacock. Ancient southern constellation named by Bayer. It possesses several double stars, notably Zeta Pavonis.

Pawl. Device used in engineering to control movement. It consists of a wedge-shaped catch pivoted at its centre and moving either freely or spring-controlled. The pointed end of the pawl engages with the ratchets of a cogged wheel or rack, and can give limited motion to the wheel or rack or prevent reverse motion. It is fitted on winches, capstans, and other winding machines. The tension of the mainspring of a watch or clock is held during winding by a pawl.

Pawn. Chessman, one that is not a "piece." Each player begins with eight pawns, which he places one in front of each of his pieces. The pawn moves only one square

forward at a time, except that its first move may be two squares. It captures an opposing man one square forward diagonally. A pawn reaching the far side of the board becomes any piece its owner chooses. See Chess illus., p. 1996.

Pawnbroker. Person licensed to lend money at interest on the security of articles deposited with him. The origin of pawnbroking may be traced to early times, both in Europe and in Asia. In Christendom, however, the practice was philanthropic in character, rather than commercial, since the *mont de piété* was originally an Italian institution, supported by the popes, and based on loans to the poor, free of interest. Various attempts were made, the earliest in 1361, to introduce this benevolent system into other countries, but in the end interest was everywhere charged by pawnbrokers, though the rates were controlled by legislation.

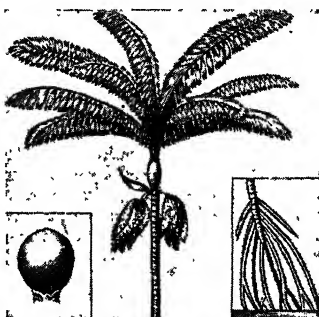
Pawnbroking and banking often went together, and in England, in the reign of Edward I, certain Italian traders gained a foothold on or near the site of Lombard Street. The origin of the three golden balls as the pawnbroker's sign is doubtful; it is at any rate improbable that, as one story goes, they are derived from the arms of the Medici, though that family gained much power by profitable loan transactions with needy potentates. The Lombards enjoyed their monopoly of pawnbroking until exorbitant charges brought their expulsion in the reign of Elizabeth, and the first year of her successor brought the first controlling legislation. Further regulating Acts were passed in 1756, 1783, 1800, 1856, 1859, and 1860, and these were consolidated in the Act of 1872.

For loans over £10 a pawnbroker is subject to the same rules as moneylenders, for those not over £10 to the Pawnbrokers Acts, 1872 and 1922. His profit on loans of 40s. or under is $\frac{1}{4}$ d. for the first month and for each succeeding month or part of month, on every 2s. or fraction of 2s.; he may charge for the pawn ticket, and also, at the time of the pledge, charge $\frac{1}{4}$ d. for each 5s. or part of 5s. lent. On loans over 40s. he may charge $\frac{1}{4}$ d. for each month or part of month on each 2s. 6d. or fraction of 2s. 6d. Special contracts, however, may be made with loans exceeding 40s.

Every pawnbroker must take out an annual licence granted by the local authority at a cost of £7 10s. He must also display his rates of interest, and keep his

books in good order. The act also sets out certain things which the pawnbroker must not do, e.g. take an article in pawn from an intoxicated person.

Pledges may be redeemed at any time within one year and seven days, on production of the pawn ticket and payment of the loan and accrued interest. Articles unredeemed within the specified term, if pawned for 10s. or less, become the absolute property of the pawn-



Paziuba Palm. Head of leaves; inset: left, fruit; right, aerial roots

broker, and cannot be redeemed after the time has expired. Those pawned for over 10s. may be redeemed even after the time has expired, unless already disposed of. Full records of all articles sold must be kept for three years for inspection on demand by the holder of the ticket, who may also demand from the pawnbroker, within the same period, any sum received from the sale in excess of the charges due and the expenses of the sale of articles pawned for over 10s. If the sale results in a deficit, the pawnbroker may sue for the difference.

Pawnbrokers are liable for loss by fire, or damage by neglect to pledges in their possession. They also have to exercise great caution with regard to goods which may have been stolen.

Pawnee. Confederacy of North American Indian tribes, formerly in Nebraska. Taking part in the Caddoan migration from the S.W., they came into contact with the Algonquins, who enslaved their captives, and in the 17th century bartered them to the white colonists. Hence Pawnee came to denote any aboriginal slave. Only a few hundreds remain, in Oklahoma.

Pawtucket. City of Rhode Island, U.S.A., in Providence co. It stands at the head of navigation on both banks of the Blackstone (known locally as the Pawtucket or Seekonk), 4 m. N. of Providence. It is served by the New York, New Haven, and

Hartford rly., and there is steamship connexion with New York. The state's second largest city and manufacturing centre, it forms virtually a single community with Providence and Central Falls. Pawtucket Falls, 50 ft. high, provide water power. Pawtucket has textile manufactures of all materials and varieties, and contains dyeing, bleaching, and finishing works. It became a city in 1885. Pop. 75,797.

Paziuba Palm (*Iriartea ventricosa*) OR ZANONA PALM. Tall tree belonging to the family Palmae, found in the Amazon region and Guiana. The trunk, which attains a height of 60 to 100 ft., has a considerable bulge in girth about half way up, and throws out aerial roots about 6 ft. from the ground. The leaves are 12 to 20 ft. long, divided into two rows of leaflets.

Paxo OR PAXOS. Smallest of the seven chief Ionian Islands, Greece. With dimensions 5 m. by 2 m. and a rocky surface, it produces fruits and olive oil. The capital is Gaios, on the E. coast.

Pax Romana (Lat., Roman peace). Term applied to the condition of the Roman empire from the accession of Nerva, A.D. 98, to the death of Marcus Aurelius, 180. This period was one of profound peace. The analogous phrase Pax Britannica came into use during the 19th century to denote the peace maintained by British military strength, in particular by the R.N., which kept the high seas open for all peaceful traders.

Paxton, Sir Joseph (1801-65). British architect. Born at Milton Bryant, Beds, Aug. 3, 1801. the

son of a small farmer, he was appointed superintendent of the gardens at Chatsworth in 1826. Here he built the conservatory and fountains, and when the Great Exhibition of 1851 was planned the former served as a model for the Crystal Palace. Paxton was knighted in 1851, and represented Coventry in parliament from 1854 until his death at Sydenham, June 8, 1865.

Pay As You Earn. Term for a system of income tax deduction on wages and salaries. It was introduced in April, 1944, under the Income Tax (Employment) Act, 1943. All employers had to



Sir Joseph Paxton, British architect After Oakley

deduct from payments of wages and salaries the instalments of tax payable by the employee. Previously the tax had been assessed after the expiration of the period during which it had been earned; half-yearly demands for payment were normally received by the individual several months after he had received the remuneration, which sometimes meant hardship. Some employers had introduced voluntary schemes to mitigate this hardship by deducting tax weekly or monthly, before this plan became compulsory.

Assessment of liability to tax was related to current earnings, varying with the earnings from week to week or month to month. Each individual had a code number dependent on the tax allowances to which he was entitled by personal circumstances. The employer was supplied with tax tables for all the code numbers of his employees and had for each employee a tax deduction card, showing the gross pay to date and the tax payable on it. Each employee should receive an annual assessment based on his income return and tax payments during the preceding year. Arrears of tax may affect the code number.

Paymaster. An administrative officer in the navy and army. In the navy the grades range from assistant paymaster (under four years' standing), corresponding to sub-lieutenant, to the paymaster-in-chief, who has equivalent rank to executive captain. They may be distinguished by a white stripe added to the gold cuff stripe or stripes. See Royal Army Pay Corps.

Paymaster-General. Government official in charge of a small department which pays out public money in accordance with the votes of parliament, and as requisitioned by the Treasury. He is a member of the government, but not of the cabinet, and is unpaid. He was first appointed after 1660, and perquisites and commissions long made his office perhaps the most lucrative in the public service. In 1835 the office was reorganized and is now of secondary importance. See Treasury.

Payment of Members. Term used for the payment of salaries to members of a legislature. In England the payment of members' expenses, as distinct from salaries, dates from Norman times, and was at first defrayed from the constituencies, but lapsed during the Stuart period, when a seat in

the house of commons was regarded as a privilege. With the growth of the Liberal party in the 19th century and the return of members who did not have private incomes, various proposals to pay them were made, and on Aug. 11, 1911, a salary of £400 a year was sanctioned by parliament. In 1921, a bill was introduced to exempt these salaries from income tax, but was defeated by a vote of the house. In 1931, during the financial crisis, the figure was reduced to £360, but it was increased to £380 in 1934 and restored to £400 next year. In 1937 it was raised to £600 a year, and in 1946 to £1,000 a year, of which half was to be tax free. By the same legislation, rly. season tickets were allowed to members for daily journeys between their homes and Westminster during sessions.

Most British dominions pay the members of their legislatures. Members of the upper and lower houses of the Canadian parliament receive \$4,000 a session with travelling and other expenses allowed; a deduction of \$25 a day is made for every day beyond 15 when a member does not attend. Members of the New Zealand legislative council receive £375 a year, and of the house of representatives £750 a year; travelling expenses are allowed, and there is a deduction for non-attendance. Members of the senate and house of representatives in the Australian Commonwealth are allowed £1,000 a year with free rly. passes. In New South Wales the legislative council receive no salary but may travel free on rlys. and trams; while members of the legislative assembly each receive £375 a year, free passes on rlys. and trams, and a postal allowance of £30 a year. Queensland pays its legislators £850 annually plus travelling expenses and an allowance for stationery and postage.

Representatives and senators of the U.S. congress each receive about £2,000 a year with travelling, postal, and clerical expenses. See Member of Parliament.

Payne, (BEN) IDEN (b. 1881). British theatrical producer. Born at Newcastle-upon-Tyne, Sept. 5, 1881, he was educated at Manchester grammar school, and joined Benson's company in 1899. After helping Miss Horniman to organize her company for the Gaiety Theatre at Manchester, he produced there, 1907-11. During the First Great War he produced

plays in the U.S.A., becoming visiting professor at the drama school at Pittsburgh and the state university at Iowa. He was director of the Shakespeare memorial theatre, Stratford-on-Avon, 1935-43, then of the American Shakespeare Company.

His daughter, who acted as Rosalind Iden, born in Manchester July 29, 1911, was for years in Shakespearean repertory as leading lady to Donald Wolfit, whom she married in 1948. See Acting illus. p. 77.

Payne, JOHN HOWARD (1791-1852). American actor and playwright. He is chiefly remembered as the author of *Home, Sweet Home*, introduced into the opera Clari, 1823. He was U.S. consul at Tunis, 1842-45, and from 1851 until his death.

Paysandú. Department of W. Uruguay. It is situated E. of the Uruguay river, which separates it from the Argentine prov. of Entre Ríos. It is rich in minerals, yielding gold, silver, copper, and iron. Sheep and cattle are reared, and the vine is cultivated. Area, 5,115 sq. m. Pop. 84,265.

Paysandú, the capital, was founded in 1772 on the E. bank of the Uruguay river, 282 m. by rly. N.W. of Montevideo. It has large abattoirs and carries on a trade in livestock. Pop. 31,000.

Payta. Seaport of N. Peru, in the dept. of Piura. It exports cotton, cotton-seed, goat skins, and hides. The port is specially equipped for traffic in petroleum. There is a short rly. to Piura, the capital of the dept. Pop. 4,000.

Pea (*Pisum sativum*). Annual climbing herb of the family Leguminosae. Its seeds and pods are edible, and form one of the most popular vegetables. The origin of the garden pea is unknown, but it is said to have been introduced into England from S. Europe in 1548. The seed is best sown monthly from Feb. to May or June, in a deep rich soil with a little lime. Seeds are sown



Pea. Pods of green pea, showing ones split open
Courtesy of Carters

about 3 or 4 ins. deep and 1 in. apart diagonally for the dwarf kinds, and at a greater distance for the taller sorts, while the rows are from 18 ins. apart for the dwarf kinds and from 4 to 6 ft. apart, according to height; for the taller growing varieties. The plants are usually trained upon brushwood, known as pea-sticks, or across horizontally stretched wires or strings. Dwarf peas need no training, but are apt to be spoiled by violent rains. The variety known as sugar pea has edible pods. -See Fruit; Sweet Pea.

Peabody. City of Massachusetts, U.S.A. It is in Essex co., 2 m. by rly. W. of Salem. It contains the Peabody Institute, with a fine library and lecture hall. The city is mainly concerned with leather industries, and besides boots and shoes produces gloves, electrical appliances, and cotton goods. Formerly known as South Danvers, it assumed its present name in 1868 in honour of George Peabody (v.i.). It became a city in 1916. Pop. 21,711.

Peabody, GEORGE (1795-1869). American philanthropist. Born at South Danvers, Mass., Feb. 18, 1795, he was employed as a lad in a dry goods store, setting up in business for himself in 1814. Branches were opened in New York and Philadelphia, and in 1837 Peabody came



George Peabody
American
philanthropist

to London, where, retiring from the American business in 1843, he set up as a merchant and banker. The large fortune he had amassed in America he employed in philanthropic work. He gave £150,000 for the London poor, and £500,000 to establish the Peabody buildings. In 1866 he founded the Peabody museum of natural history at Yale, Conn., and the museum of archaeology and ethnology at Harvard. He died Nov. 4, 1869; after lying in state in Westminster Abbey, his remains were taken to America. His statue is behind the Royal Exchange. South Danvers was renamed Peabody in 1868.

Peabody Museum. There are two institutions of this name in the U.S.A., each founded by George Peabody in 1866. (1) The Peabody museum of archaeology and ethnology at Harvard has sent out more than 450 expeditions to various parts of the world, with notable

results in Mayan archaeology and the ethnology of the Pacific Islands, Africa, S. America, and the plains and N.W. coast of N. America. (2) The Peabody museum of natural history at Yale is primarily interested in research and teaching in connexion with palaeontology, zoology, and mineralogy. It has one of the foremost collections of dinosaurs in the U.S.A.

Peabody Trust. Fund established in 1862 by George Peabody, who gave or left a total sum of £500,000 to trustees to build houses for the working classes of London. Blocks of buildings were erected in various parts of London until there were 30 of them. By the end of 1946 the trust owned dwellings with over 20,000 rooms, in which 19,432 persons lived.

Peace. River of Canada. Rising W. of the Rockies in the mountains of British Columbia, it passes through the Rockies and flows mainly N. and N.E. through the N. of Alberta. Just N. of Lake Athabaska it joins the Slave, and the united stream empties itself into the Great Slave Lake. Its length is 1,054 m., and its chief tributaries are the Beaton, Finlay, Smoky, Little Smoky, and Parnip. The river is navigable beyond Dunvegan except for 2 m. near Vermilion Falls. Its basin covers 117,000 sq. m. The Peace River district, which straddles the provs. of British Columbia and Alberta, is rich agriculturally and in minerals, especially coal.

Peace, CHARLES (1832-79). British criminal, born in Sheffield, May 14, 1832. He received his first sentence for robbery in 1851. In 1854 he received four years' penal servitude for burglary, and afterwards always worked alone for fear of betrayal. Peace had a remarkable power of disguise. The loss of two fingers of one hand suggested to him the use of a false arm with a hook, an identity mark which he put on and off at pleasure.

On Nov. 29, 1876, Peace committed at Bannercross, near Sheffield, the murder for which he was hanged. At large after a term of penal servitude, he was living under his own name, next door to an engineer named Arthur Dyson. Bad blood arose between the two

men over Mrs. Dyson, and Peace shot the husband. He then disappeared, and, under the name of John Ward, started a career of burglary in the London suburbs, living in a large house in Peckham and passing as a rich man.



Charles Peace,
British criminal

One early morning in 1878, a policeman named Robinson came across Peace at work in the grounds of a large house on St. John's Hill, Wandsworth. Peace shot and wounded him but was nevertheless secured and, as John Ward, was convicted at the Old Bailey, Nov. 19, of attempting the life of a policeman, and sent to penal servitude for life. The woman with whom Peace had been living, however, betrayed him, and he was tried at Leeds winter assizes for the murder of Dyson, and sentenced to death. He confessed to many burglaries and at least one murder, that of Constable Cook at Manchester in 1876, for which crime a man named Habron was suffering penal servitude for life at the moment of Peace's confession. Peace was hanged at Leeds, Feb. 25, 1879.

Peace Ballot. Referendum organized in Great Britain in 1935 by the League of Nations Union. Five questions were asked: (1) Should Great Britain remain a member of the League? (2) Are you in favour of an all-round reduction of armaments by international agreement? (3) Are you in favour of the all-round abolition of national military and naval aircraft by international agreement? (4) Should the manufacture and sale of arms for private profit be prohibited by international agreement? (5) Do you consider that, if a nation insists on attacking another, the other nations should combine to stop it by (a) economic and non-military measures; (b) if necessary, military measures?

Lord Cecil announced the results at the Albert Hall, June 27, 1935. Over eleven and a half million ballot-papers were returned. The voting is shown below.

Question	Yes	No	Doubtful	Abstentions	Christian Pacifist	Total
1	11,090,387	355,883	10,470	102,425	14,121	11,559,165
2	10,470,489	862,775	12,062	213,839		
3	9,533,558	1,689,786	16,976	318,845		
4	10,417,329	775,415	15,076	351,345		
5 (a)	10,027,608	635,074	27,255	855,107		
5 (b)	6,784,368	2,351,981	40,893	2,364,441	17,482	

Peacehaven. Town of Sussex, England, about $6\frac{1}{2}$ m. S.E. of Brighton, and 3 m. S.W. of Newhaven. It stretches about $\frac{1}{2}$ m. along the South Downs on the Brighton - Newhaven - Eastbourne road. It came into existence as a product of speculative building shortly after the First Great War, and remained largely undeveloped. It is chiefly composed of small villas, bungalows, and huts, built without regard to plan or to its fine position at the summit of the chalk cliffs facing the English Channel.

Peace Pledge Union. British branch of the War Resisters' International, founded in Oct., 1934, by Canon H. R. L. Sheppard, George Lansbury, and Brig.-Gen. F. P. Crozier. Members, who pay a voluntary contribution towards the expenses of the union, sign a pledge to renounce war and never to support or sanction another. Membership reached 140,000 in 1939; during the Second Great War over 70,000 members were registered as conscientious objectors, while several thousand refused to accept the awards of the tribunals and were imprisoned. Some accepted non-combatant war service. The offices are at 6, Endsleigh Street, London, W.C.1, and there are branches throughout Great Britain.

Peach (*Prunus Persica*). Small fruit-bearing tree of the family Rosaceae. It is a native of Asia, was cultivated before the Christian era, and was introduced into Britain in the 16th century. The flowers are pink, white, and red, and the peach fruit is large, pale yellow and crimson in colour, with softly hairy skin. The nectarine, a variety, is much smaller and smooth-skinned.



Peach. Flowers and, top, fruit and section



There are two types of peaches, known as freestone and clingstone. In the former the flesh parts readily from the stone, but in the latter

fibrous cords from the stone hold the flesh around it. In Great Britain out-of-door peaches will thrive in favoured situations on walls with a S. or S.W. aspect. The fan-shaped trees are planted about 15 ft. apart, in well-drained turfy loam, with a little lime added. If the walls are not trellised or wired, the branches must be trained. Peaches require plenty of water in the summer time, and protection from winter frosts. Red spider is the principal pest. Under glass, peaches are started in pots in a temperature ranging between 45° and 60° , between Jan. and March. The potting mixture consists of loam, crushed bones, and well-rotted manure, and the trees need watering freely during spring and summer. Pruning is rather drastically performed when the shoots are about 2 ins. long. The fruit itself is thinned when it is about the size of a grape. Propagation is by seeds or grafting. There is a double-flowered peach (*Persica vulgaris flore pleno*) which is grown as an ornamental shrub, for the sake of its blossoms, in sunny borders. It thrives in any ordinary soil, and has white flowers.

Peach Palm (*Bactris minor*). Tall slender tree of the family Palmae. It is a native of the



Peach Palm. Spray of fruit of *Bactris gasipa*; inset, single fruit

Amazon region. The trunk is armed with sharp spines, and the leaves are from 2 to 4 ft. long, divided into two rows of slender leaflets a foot long. The egg-shaped, peach-like, scarlet and orange fruit is in large bunches.

Peacock (*Pavo*). Genus of the pheasant family. The common peacock (*P. cristatus*) is a native of India and Ceylon. It was introduced into Europe at an early date, and was a favourite table bird with the Romans and in the medieval period.

The peacock is one of the handsomest of birds, especially at the

breeding season, when the male displays his gorgeously eyed train for the delectation of the hens. This train is not the tail, but a prolongation of the upper tail-cover feathers, and when spread may be seen to be supported by the true tail feathers. The peacock breeds readily in captivity. The green or Java peacock is a native of Burma, Malay Peninsula, and Java, and is about the same size as the common peacock, but with a more brilliant plumage. See Bird colour plate.

Peacock, THOMAS LOVE (1785-1866). British poet and novelist. Born at Weymouth, Oct. 18, 1785,



T. Love Peacock, British author

he left school early to enter business in London, but in his leisure acquired a good knowledge of the classics. In 1812 he met Shelley, and was closely associated with him, and appointed his executor. In 1819 Peacock entered the service of the East India Company, rising to be chief examiner 1836-56. The best of his poems is *Rhizophne*, 1818, which shows the influence of Shelley, but he deserves to be remembered rather for satirical novels, such as *Headlong Hall*, 1816; *Nightmare Abbey*, 1818; *Maid Marian*, 1822; *Crotchet Castle*, 1831. He died at Halliford, near Chertsey, Jan. 23, 1866. One of his daughters married George Meredith (*q.v.*). Peacock's works were edited by H. Cole, 1875, and R. Garnett, 1891; and his life was written by C. van Doren, 1911, and J. B. Priestley, 1927.

Peak. Wild tableland of Derbyshire, England. It is in the N.W. of the county, forming the S. end of the Pennine Chain. Its highest point is Kinder Scout (2,088 ft.), other heights being Axe Edge, near Buxton (1,860 ft.), and Mam Tor (1,700 ft.). Castleton is regarded as the capital of the Peak, and Chatsworth is known as the palace of the Peak. Peveril Castle, near Castleton, figures in Scott's *Peveril of the Peak*. The Peak has no definite limits, although it may be described as the district N. of Buxton. It is a wild, moorland area, watered by a number of streams that feed the Derwent. On it are stone quarries, and grouse are shot on the moors. Peak Forest is a rly. station 36 m. N.W. of Derby. The Peak Cavern is a cave at Castleton, which goes 500 yards

into the limestone. High Peak is a parl. div. of Derbyshire.

Peake, FREDERICK GERARD (b. 1886). British soldier and administrator. Born at Melton Mowbray, he was educated at Fareham and the R.M.C., Sandhurst. Commissioned in the Duke of Wellington's Regiment in 1906, he served in India until 1913, when he was seconded to the Egyptian army to serve with the camel corps. In 1916 he transferred to the R.F.C. Inspector-general of the Trans-jordan gendarmerie, 1921, he became director of public security in the country, 1923. Peake raised the Arab Legion, which he commanded until his return to England in 1939. In 1942 he became acting inspector of constabulary for England and Wales.

Pea Nut (*Arachis hypogaea*). Herb of the family Leguminosae, better known as the ground nut (*q.v.*) or monkey nut.

Pear (*Pyrus communis*). Tree of the family Rosaceae. It is a native of Great Britain, and from E. Europe to the Himalayas. The soil in which the pear thrives best is a deep, rich loam, free from clay subsoil. When once established pears liberally repay a weekly dose of solution of nitrate of soda during the summer months. They are propagated in the same way as apples, chiefly by grafting, but the best stock to employ is the quince (*q.v.*), except for standards.

Late pears should never be left on the trees after the middle of Nov., but picked and carefully stored in a well aired room, on wooden shelves, care being taken

that one fruit does not touch another. They may be artificially ripened when desired by placing them on a sunny shelf in a heated greenhouse. The pear, particularly in an uncooked state, should be avoided by



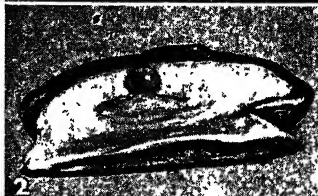
Pear. Fruit of cultivated variety

persons with a tendency to biliousness. Pears are grown in the S. and W. of England for the manufacture of perry, a mildly alcoholic beverage prepared in the same way as is cider from apples. See Perry.

Pearl. Secretion deposited by many bivalve molluscs, oysters and mussels, and a few univalves, in the form of a great number of thin layers of calcium carbonate, one upon the other. Whether

found as oval, spherical, or irregularly shaped independent objects, as "blisters" attached to the shells, or as the smooth

fera), which also is the principal source of mother-of-pearl, and another kind, *M. fucata*. These yield white, yellowish white, bluish white, reddish, grey and black pearls. The finest blacks, which are much esteemed, come from the South Seas and the gulf of Mexico. The hammer oysters of the Gambia ls. yield bronze tinted pearls. Pale rose coloured pearls with velvety lines come from the Bahamas. Garnet red, pale and dark brown ones are obtained from the fan mussel (*Pinna nobilis*), blue from the edible mussel, violet from the ark shell (*Arca Noae*), and purple from the *Ammia cepa*.



Pearl. 1. Opening shells to find pearls. 2. Shell containing a fine pearl, found off Turtle Island, 1909. 3. Cluster of Japanese pearl oysters

inner lining of the shells, called mother-of-pearl, the main composition is identical, though in some instances special colouring matter is present. The beautiful iridescent play of colour, pearly lustre or "orient," is due to irregular refraction caused by obstruction to light by the numerous thin layers. Pearls of fine shape are formed within the mantle, or fleshy substance, of the mollusc, while irregularly shaped pearls and blisters are formed between the fish and the shell or even on the shell itself.

Pearls dissolve in acids, discolour if exposed to alkali, or even to constant warmth against human skin. They are light in weight and comparatively soft, the degree of hardness being between 3 and 4. The best pearls are produced by the pearl oyster (*Meleagrina margariti-*

In the trade pearls are known as pear, bell, or drop, according to their shape; those of irregular form are known as buttons, fancy, blisters, or baroques. Paragons are of the size of small walnuts; cherries, or cherry stones, seed, shot, and dust are the smallest.

Imitation pearls are fashioned out of mother-of-pearl, but are easily detected, as the layers are not fully concentric. The finest imitation pearls are made on a principle discovered by Jacquin, of Paris, in 1680. He used hollow beads of colourless glass, coated with a mixture of gelatin and the tiny silvery scales of the bleak (*q.v.*), and filled with wax to give solidity.

"Cultured" pearls are produced by introducing into the flesh of the oyster, usually under the liver, a foreign substance which the oyster

covers with nacre. The Japanese were noted for their development of this branch of the industry.

Most pearl fisheries are found within the tropic seas. In ancient times pearls came chiefly from India and the Persian gulf. Other current sources are the Sulu sea, the coasts of Ceylon and Australia, the shores of Central America, Bahrein, Borneo, Aru Is., New Guinea, Labuan, Timor, New Caledonia, the bay of Mulege, the gulf of California, La Paz, the Caribbean sea, the gulf of Mexico, and Venezuela. River pearls are found in temperate climates in the northern hemisphere; pearls were found in Scotland in 1355. Principal Scottish rivers which have yielded pearls are the Spey, Tay, South Esk, and Forth. Pearls are also found in many parts of the U.S.A., notably in the Mississippi and in Warren co.

Fishing is generally undertaken by divers from boats, armed with knives and bags attached to belts round their waists to contain the oyster shells. In other instances baskets are lowered and hauled up by ropes. Many fishers wear diving dresses, which enable them to remain longer in deep water. In Australia, where pearl oyster beds are laid down in shallow waters, dredging is also adopted. See Australia; Bahrein Islands.

Bibliography. The Great Barrier Reef of Australia: Its Products and Potentialities, W. Saville-Kent, 1893; Report on the Pearl Oyster Fisheries of the Gulf of Manaar, W. A. Herdman, 1903; Book of the Pearl, G. F. Kunz and C. H. Stevenson, 1908; Pearls, W. J. Dakin, 1913.

Pearl. English poem. It was written about 1370 by the unknown author of Sir Gawayne and the Green Knight, Cleanness, and Patience. Pearl, written in 101 stanzas of 12 lines, tells how the author, grieving at the death of his infant daughter, whom he calls his pearl, sees her in a vision as a grown maiden standing on the farther bank of a river. She comforts and instructs him, and finally shows him the New Jerusalem. Consult editions by I. Gollancz, 1891; C. G. Osgood, 1906; Pearl rendered into Modern English, C. G. Osgood, 1907.

Pearl. River of Mississippi, U.S.A. Rising in Winston co., it follows a winding course of 295 m. to the Rigolets, a channel communicating between lakes Borgne and Pontchartrain. It drains an area of 7,250 sq. m. and is navigable for small craft for about one-third of its length, while larger vessels reach Gainesville. In 1816

the Pearl river convention met to petition congress for Mississippi's admission to the union.

Pearl. Group of islands in the Bay of Panama, Central America, belonging to the republic of Panama. The largest are San Miguel, Del Rey, San José, and Pedro Gonzales, and there are numerous islets. They were so named from the pearl fisheries, which are actively prosecuted.

Pearl. Type, half the size of long primer, a size smaller than ruby and a size larger than diamond. It is known also as 5 point, and about 15 lines make an inch in depth. It is called both *Parisienne* and *Sédanoise* in French, *Perl* in German, *joly* and *pearl* in Dutch, and *occhia di mosca* in Italian.

Pearl Ash OR POTASH. Crude, impure potassium carbonate. It was formerly obtained by burning waste wood, extracting the ashes with water, and evaporating the solution in earthenware pots. Most of the potassium carbonate today is made from potassium chloride by heating with magnesium carbonate, water, and carbon dioxide under pressure to give a double salt of potassium and magnesium. This is decomposed by heating and the potassium carbonate recovered from the filtrate. Pearl ash is used in the manufacture of glass and soap.

Pearl Fruit (*Margyricarpus setosus*). Small shrub of the family Rosaceae. It is a native of the Andes. The alternate leaves are broken up into awl-shaped leaf-

lets. The inconspicuous, small green flowers are produced at the base of the leaves, and are succeeded by the minute pearly fruits which give the plant its name.

Pearl Harbour. Port of Oahu, one of the Hawaiian group of islands in the Pacific Ocean. Situated 7 m. W. of Honolulu, the



Pearl Harbour. Air view of the U.S.A. naval base in the Pacific, four years after the Japanese attack in 1941.

port is landlocked and provides deep anchorages. Pearl Harbour is the principal U.S. naval base in the Pacific, and has adjacent to it a number of army and marine corps flying fields. Here on Dec. 7, 1941, Japanese aircraft attacked the harbour installations and units of the U.S. Pacific fleet, so bringing the U.S.A. into the Second Great War (*v.i.*).

Pearl Harbour, ATTACK ON. At 7.55 a.m. (local time) on Dec. 7, 1941, Japanese midget submarines and carrier-borne aircraft made a devastating attack on the U.S. warships and installations at Pearl Harbour. The attack took place before the Japanese declaration of war, which was not made until some hours later, and while Japanese envoys in Washington were still negotiating with the U.S. secretary of state.

As Pearl Harbour lies nearly 4,000 m. from Japan, and some 2,000 m. from the Japanese mandated Caroline and Marshall Is., the forces taking part in the attack must have received their orders some days previously. Although many warnings had been issued to the military and naval commanders at Hawaii, no attempt had been made to put the Pearl Harbour defences at readiness.

There was a complete lack of cooperation between Admiral Kimmel, the naval commander, and Lt. Gen. Short, the army commander. The army's aircraft warning service was not operating; no regular



Pearl Fruit. Flower-bearing branch of this small shrub. Inset, left, leaf; right, fruit

reconnaissance or inshore patrols were maintained by either service; neither the A.A. nor coastal batteries were manned or supplied with ammunition; and the anti-torpedo net closing the harbour was open. An attack by Japanese submarines and the possibility of Japanese sabotage in Hawaii had been envisaged and a few minor precautions taken; but both commanders, being convinced that the risk of air attack was negligible, deliberately ignored orders from Washington. Shortly after 6.30 a.m. on Dec. 7 a small Japanese submarine was sunk by a U.S. patrol plane and the U.S.S. Ward in the prohibited area of Pearl Harbour, and at 7.45 a.m. a second midge submarine was sighted inside the harbour net defences. On neither occasion did the naval authorities issue an alert or take any precautions. At 7.2 a.m. an n.c.o. under training at the aircraft warning station, which normally closed down at 7 a.m., picked up a large flight of aircraft at a distance of 130 m. N.E. of Oahu. When this was reported 18 mins. later to the central information centre, no action was taken.

The formation, consisting of 21 torpedo-dropping aircraft, 30 dive bombers, and 15 horizontal bombers, divided into three sections, one attacking the naval aerodrome at Kaneohe bay, another the army air bases at Wheeler and Hickham Field, and the third the warships in Pearl Harbour. The dive bombers concentrated on the airfields, and in eight attacks put out of action 150 of 202 naval aircraft and 97 of 273 army fighters and bombers. Owing to the cratering of the runways, few of the surviving army aircraft were able to take off to oppose the enemy. Of the 52 naval aircraft undamaged, 38, in addition to 7 patrol planes already up at the moment of attack, became airborne and engaged. By a coincidence, 18 U.S. reconnaissance bombers from a U.S. carrier arrived at Kaneohe bay while the raid was in progress; four of these were shot down and one disabled, but the remainder took the air.

The attack on Pearl Harbour, where 86 warships of the Pacific fleet were at anchor, was also made in eight runs. One of the battleships immediately opened machine-gun fire and brought down two torpedo planes. Within 10 mins. all ship-borne A.A. batteries had come into action.

The first phase of the Japanese attack lasted half an hour. From 8.25 a.m. until 8.40 a.m. there was a comparative lull. This was ended by a dive and precision bombing attack which destroyed the port and airfield installations. At 9.45 the Japanese withdrew, having lost 40 of their 105 aircraft engaged. Three Japanese submarines of 45 tons were accounted for.

For their comparatively light losses, the Japanese had achieved their object of immobilising for a time the U.S. Pacific fleet. Five battleships, three destroyers, a minelayer, and a large floating dock were either sunk or so seriously damaged that they were militarily useless. Three battleships, three cruisers and a number of smaller craft were temporarily out of action. Of the vessels listed as sunk or damaged, only one battleship became a total loss, and by Dec., 1942, most of the others had been salvaged or repaired. Losses in personnel were particularly heavy: naval and marine corps casualties were 2,117 killed, 876 wounded, 960 missing; those of the army 226 killed and 396 wounded.

On Dec. 16, 1941, Admiral Kimmel and Lt.-Gen. Short were relieved of their commands, and on March 1, 1942, the U.S. war and navy depts. announced that both officers would be court-martialled on charges of dereliction of duty, but that the court martial would be postponed until such time as public safety and interest permitted. No court martial took place, however.

The raid on Pearl Harbour gave Japan air and sea supremacy, and effectively prevented any immediate linking of U.S. and British Far Eastern naval forces.

So insistent was the public demand for an explanation that eight separate inquiries concerning the disaster were made between 1941 and 1945. The final inquiry issued its report, a document of 492 pages, on July 20, 1946, and placed the blame squarely on the two local commanders.

Documents captured during the occupation of Japan and the examination of Japanese officials proved that a surprise attack on Pearl Harbour was originally proposed and planned early in Jan., 1941, by Admiral Yamamoto, c.-in-c. of the imperial navy. Early in Sept., 1941, these plans were incorporated into a secret operation order, issued in Nov., when Japan finally decided upon war with the U.S.

The disaster of Pearl Harbour united the diverse elements in the U.S.A. in determination to wage war until Japan and her allies were destroyed, and enabled President Roosevelt to mobilise the country's manpower and resources on a scale which would have been impossible in the First Great War.

David Le Roi

Pearlite. Constituent of steel, an intimate mixture of ferrite and cementite. It was first described by H. C. Sorby, who called it the pearly constituent of steel. It may be either granular or lamellar in structure, and, if the latter, the lamellae may be alternately hard and soft. If the polished surface of a steel containing pearlite is etched with acid, and then viewed obliquely in white light, the surface presents a mother-of-pearl appearance; hence the name pearlite. It is characteristic of steel which has cooled slowly from a high temperature. The term is also used to describe similar lamellar microstructures in other alloys. See Steel.

Pearl Powder. Crystalline form of calcium sulphate employed in paper making for hardening the surface of paper. It is also known as pearl hardener. A powder made from fish scales, used for giving the effect of pearl to celluloid and xylonite, is known commercially as pearl powder. The term is also used for a cosmetic consisting of bismuth oxychloride.

Pearse, PATRICK HENRY (1879-1916). Irish politician. He was born in Dublin, Nov. 10, 1879, his father being English. A leader of the Gaelic revival as a means of advancing Irish Nationalism, he toured Europe and the U.S.A. and then founded a school near Dublin. Here, however, after the transport strike of 1913, the study of arms accompanied that of language, for Pearse was active among the Volunteers. At the Easter rebellion of 1916 he was in command, and though he ordered surrender when the civilian dead numbered 400, he was executed by British authorities, May 3.

Pearson, SIR CYRIL ARTHUR (1866-1921). British newspaper proprietor. Born Feb. 24, 1866, at Wookey, Somerset, son of the Rev. A. Cyril Pearson, he was educated at Winchester. He began journalism as sub-editor of Tit Bits, founded Pearson's Weekly in 1890, Home Notes in 1894, Pearson's Magazine in 1896, and the Daily Express (*q.v.*) in 1900. Somewhat later he acquired a controlling



Sir C. A. Pearson,
British newspaper
proprietor

amalgamated with the last named the *St. James's Gazette*. Over-taken by blindness, he retired from journalism in 1912 and devoted himself to the welfare of those similarly afflicted, especially of soldiers and sailors, organizing *St. Dunstan's (q.v.)* of which he was the first chairman. He was made a baronet in 1916 and a G.B.E. in 1917. Died Dec. 9, 1921.

Pearson, JOHN (1613-86). English divine. He was born at Great Snoring, Norfolk, Feb. 28, 1613, and educated at Eton and King's College, Cambridge, of which he became a fellow. In 1640 he was appointed rector of Thorington. In 1654 he became weekly preacher at S. Clement's, Eastcheap, London, and there delivered the sermons which in 1659 he published under the title of *An Exposition of the Creed*. In 1660 he became master of Jesus College, Cambridge, in 1661 professor of divinity, in 1662 master of Trinity College, and in 1673 bishop of Chester. He died July 16, 1686.

Pearson, KARL (1857-1936). British scientist. He was educated at University College School, London, and King's College, Cambridge, and was called to the bar at the Inner Temple, 1882. His interests, however, were largely scientific, and he studied the theories of evolution and heredity, especially from the mathematical standpoint. He was professor of eugenics and director of the laboratory of national eugenics in the university of London. Pearson wrote many books on science, including *The Chances of Death and Other Studies in Evolution*, 1897; *The Grammar of Science*, his most important work, 1899, rev. ed., 1911; *The Life and Letters of Francis Galton*, 1914. He died April 29, 1936.

Peary, ROBERT EDWIN (1856-1920.) American explorer. Born May 6, 1856, he entered the U.S.

navy as a civil engineer in 1881. Arctic exploration had long been his study and during 1891-92 he carried out a sledging expedition of 1,300 m. from McCormick Bay to the N.E. coast of Greenland. Other voyages followed between 1893 and 1897; in 1898 he surveyed and charted the coast N. of Greenland, and in 1902 and 1905 he made attempts to reach the Pole. In 1908 he began the voyage which,

according to his own account, led to his discovery of the N. Pole, April 6, 1909, although some doubt at first existed whether he

actually reached it. Promoted rear-admiral, 1911, he died at Washington, Feb. 19, 1920. See *Arctic Exploration*; Cook, F. A.; *Consult* North Pole, R. E. Peary, 1910; Peary, W. H. Hobbs, 1937.

Peary Land. Desolate ice-bound tract of N. Greenland. It was discovered by Lockwood and Brainard in 1882. The neighbouring fiords were explored in Rasmussen's second Thule expedition, 1916-17. It was named after Peary, the explorer, who spent a considerable period in surveying this region.

Peasantry (Fr. *paysan*, from Lat. *pagensis*, countryman). General term for the rural population of a country labouring on the land for wages, or holding and tilling small plots of land for themselves. See *Allotment*; *Labourer*; *Métayer System*; *Small-holdings*.

Peasants' Revolt. Rising of the peasantry in England in 1381. There was at this time much discontent due to the enactment of the statute of labourers, a consequence of the Black Death, and to other causes. The imposition of a poll-tax brought matters to a head. On May 30 there was an outbreak at Brentwood. On June 2 a more serious movement began. In Kent Wat Tyler, supported by John Ball, appeared as its leader.

Maidstone and Dartford were centres of disorder, while Essex and other eastern counties were also in revolt. Manor houses and manor rolls were destroyed, lawyers singled out for vengeance. The Kentish and Essex rebels marched to London, burned the prisons and other buildings in Southwark, crossed London Bridge, and murdered Simon of Sudbury, archbishop of Canterbury, and the treasurer, Sir Robert Hales. At

Mile End Richard II met them and persuaded some of them to go home. Next day, June 15, there was another meeting at Smithfield, where Tyler was stabbed by the lord mayor, but Richard quieted his followers, who dispersed on the strength of his promise that their grievances should be removed. This, however, was not kept. Meanwhile, the Norfolk rebels had been crushed at N. Walsham by the bishop of Norwich. See *England: History*; Tyler, W. *Consult* *Rising in E. Anglia* in 1381, E. Powell, 1895; *The Great Revolt of 1381*, C. Oman, 1906; *London Bridge is Falling*, P. Lindsay, 1934; *Nine Days that Shook England*, H. Fagan, 1938.

Peasants' War. Rising of the peasantry which took place in Germany in 1522-25. It was due mainly to economic causes, and broke out in the Black Forest area. The rising, however, spread to Franconia, and was especially successful in Thuringia. Roused to action, the princes collected an army, and, led by Philip of Hesse, defeated the Thuringian rebels at Frankenhäusen in May, 1535, their leader, Thomas Münzer, being killed. See *Germany: History*.

Pease. Name of a family famous in the industrial life of N. England. The first to attain wealth and position was Joseph Pease, a woollen manufacturer at Darlington about 1760. His son, Edward (1767-1858), helped George Stephenson in his rly. enterprises and became connected with the coal, iron, banking, and other industries in and around Darlington. His sons, Joseph and Henry, were both members of parliament, Joseph being the first Quaker to sit therein. Of the next generation the most prominent members were Sir Joseph Whitwell Pease (1828-1903), created a baronet in 1882, and his brother, Arthur. Both sat in parliament, as did their sons.

Sir Joseph's elder son, Sir Alfred E. Pease, was a great hunter and sportsman, and the younger, Joseph Albert was made Lord Gainford (*q.v.*) in 1916. Arthur's son, Herbert Pike Pease, held office on the Unionist side, and later in Lloyd George's coalition government. In 1923 he became Lord Darynton and was an ecclesiastical commissioner. Earlier Peases were Quakers and advocates of peace and the abolition of slavery.

Peat. Spongy substance of vegetable origin common to almost every temperate country. The larger part of British peat appears



R. E. Peary,
American explorer



John Pearson,
English divine

to be composed of mosses, hill peat being mainly sphagnum and andromeda, while lowland is principally hypnum moss. The formation of peat depends upon a particular combination of climatic and topographical conditions. There must be a soil which will retain water at or near the surface, a sufficiently low temperature to prevent rapid evaporation, a temperature not too low to prevent the growth of vegetation, yet low enough to check too rapid a decay. The average temperature best suited for the formation of peat ranges from 42° to 48° F.

The process which converts plant substances into peat is similar to that which has formed the coal measures, but the oldest peat deposits are, geologically speaking, modern compared with coal. Peat bogs cover an area of about 6,000,000 acres in the British Isles, Ireland alone possessing 3,000,000 acres. They vary greatly in depth, in Ireland rarely exceeding 20 ft., while in parts of Wales and on Dartmoor the deposits are as much as 40 ft. deep.

Pure peat, thoroughly dry, contains from 49 to 64 p.c. of carbon,



and has a calorific value rather more than half that of a similar weight of black coal. In most areas peat is cut by hand, with a long, narrow, very sharp shovel. Freshly cut, it contains as much as 80 p.c. of water. The turves or sods are stacked edgewise, leaning one against another, and dried by sun and air. The mechanical cutting of peat has been introduced in some countries, e.g. Eire, Germany, and Russia, where the product has been used for steam generation. Peat can

be burned in its natural air-dried state, milled and compressed into briquettes, or as a dried powder. Other uses are to produce gas for gas engines; as peat moss litter in agriculture and horticulture; and for the extraction of certain kinds of wax. Consult Peat and its Manufacture, Björling and Gissing, 1907; Winning and Utilisation of Peat, A. Hansding, 1921; The Winning, Harvesting and Utilisation of Peat, H.M.S.O., 1948.

Pebrine or **MUSCARDINE**. Disease affecting silkworms. It was formerly ascribed to the attack of a fungus, but is now known to be caused by a microscopic single-celled protozoan (*Nosema bombycis*). The disease manifests itself by the appearance of dark spots on the skin, the larva becomes languid and stunted, with defective appetite. Most die in the larval stage, but a few contrive to spin a loose cocoon and pupate. If moths emerge from the pupae they are feeble, and their eggs transmit the disease to the next generation. The disease, which is both contagious and infectious, and has at times been epidemic in the silk-producing districts of France and Italy, can be combated only by killing the sick insects. It is prevented by cultivating the larvae out of doors on netted trees. It is estimated that before Pasteur

established its true nature, the disease involved the French silk industry in a loss of £40,000,000.

Pecan (*Carya illinoensis*). Alternative name for the American hickory nut (q.v.).

Peccary (*Pecari*). Genus of ungulate mammals with only three toes on the hind foot. They are natives of America from Paraguay to Arkansas and Texas. Although much resembling small pigs in appearance and gregarious habits, they have no tails. The bones above the foot unite to form a cannon-bone. The most



Peccary. The collared peccary, a tailed mammal of America

familiar species is the collared peccary (*P. angulatus*).

Peck. Measure of capacity for liquids and dry goods. It is equal to two gallons. Under the Weights and Measures Act, 1878, the measure must not be heaped.

Peckham, District of London. It is part of the bor. of Camberwell, and was anciently a manor and village, in the parish of S. Giles. It is mentioned in Domesday Book, and was formed early in the 7th century. It comprises Peckham Rye and lies N. of Honor Oak, where stood the boundary oak between Kent and Surrey; W. of Hatcham, where is now New Cross; S. of Rotherhithe; and E. of Camberwell Green. Peckham Road, Peckham High Street, and Queens Road (formerly Deptford Lane) connect Camberwell with New Cross. In Camberwell Church Street is S. Giles's church, and in Peckham Road are Camberwell town hall, school of arts and crafts, and the site of the central library. At the corner of Lyndhurst Way is Peckham House, an 18th century mansion, now devoted to the cure of nervous disease. In the vicinity are the S. Metropolitan gas works, founded 1833, and the Licensed Victuallers' Asylum, founded 1824.

As a manor Peckham was successively the property of Westminster abbey, Bishop Odo of Bayeux, William Rufus, Henry I, and Robert, 1st earl of Gloucester. King John hunted in its park, and literary figures such as Donne, Goldsmith, and Browning were residents. From 1840 Peckham lost its rural attractions, being rapidly built over and industrialised. Peckham Rye Park, opened 1894, still preserves some



Peat. Women bagging peat. The conical heaps are termed ruckles, and the peat is set out in this way to dry. Above, left, cutting blocks of peat at Wedmore, Somerset

of the ancient charm in its 42 acres. The Rye is an ancient common of 64 acres, through which ran the "river or "rhee"; it is now mostly devoted to allotments. For details of the interesting experiment in social medicine conducted in Peckham, see Pioneer Health Centre.

Pecksniff, SETH. Character in Dickens's novel *Martin Chuzzlewit*, who has become the recognized personification of unctuous hypocrisy. An architect and surveyor by profession, he exudes pious, moral, and charitable sentiments, while practising every kind of petty meanness to gain his own selfish ends.

Pecock, REGINALD (c. 1395–1460). English bishop. He was educated at Oxford, where he became fellow of Oriel College, and in 1431 he was appointed master of Whittington College, London. He became bishop of St. Asaph in 1444, and was translated to Chichester six years later. He engaged in bitter controversy against the Lollards, preaching against church reform at Paul's Cross, and his utterances brought him into such disrepute that his books were publicly burnt, his name was removed from the privy council, and he was compelled to recant publicly and resign his bishopric in 1458. His later days were spent in retirement at Thornhay Abbey.

Pecos. River of U.S.A. Rising in the N.E. part of New Mexico, it flows first S.E. and then S. into Texas along the W. scarp of the Llano. There it again assumes a S.E. course, finally entering the Rio Grande, about 37 m. N.W. of Del Rio. It is 800 m. long, but is of little commercial value apart from irrigation. At Hondo and Carlsbad are two irrigation projects of the U.S. national reclamation service, the canals and ditches of which irrigate 30,000 acres. Since 1936 the reclamation service has carried out extensive experiments in erosion control.

Pécs. Town of Hungary. Formerly known as Fünfkirchen (Ger., five churches), it is 105 m. S.S.W. of Budapest, and has a large and interesting cathedral. Two of the churches were originally Turkish mosques. The university, one of the best-known in Hungary, was founded at the end of the Middle Ages, and before the Second Great War had over 1,000 students. There is an academy of law. Industries include weaving, tanning, and papermaking; there are large coal mines in the district. Pécs existed in Roman times, and

during the Middle Ages appears under its Latin name of *Quinque Ecclesiae*. During 1543–1686 it was under Turkish rule. During the Second Great War it was one of a number of important places captured by Tolbukhin from the Germans, Nov. 29, 1944.

Pecten. Genus of marine bivalve molluscs (*Lamellibranchiata*). It includes about a dozen British species, some of which are used as food and are commonly called scallops or clams. The species are exceedingly numerous, of world-wide distribution, and found at all depths down to about 3,000 fathoms. The valves, which have usually an unequal pair of ear-like expansions at the hinge, are variously ribbed and brightly coloured. The animal does not use its foot for locomotion, young specimens fitting through the water like butterflies by opening and closing the valves, and when older attaching themselves to rocks, etc., by byssal threads spun by the foot.

Pectin. Gelatinous substance related to the sugars, mucilages, and gums. It is found in such fruits as apples and gooseberries, and in fleshy roots, e.g. carrots and beets. It is this body which causes jams made from fruits to set into a jelly. To supply the natural deficiency in strawberries, cherries, etc., the manufacturer of jams sometimes adds other gelatinising materials, or combines apple and gooseberry pulp with fruits deficient in pectose bodies. Pectin has a nutritious value similar to that of starch. It may be valuable in the treatment of diarrhoea.

Pectoral (Lat. *pectus*, breast). Object worn or laid upon the breast. Ancient



Pectoral Cross, as used in the Church of England
By courtesy of the Warham Guild

a pylon-shaped plaque was placed upon the breast of the embalmed body. See Breastplate.

Peculiar (Lat. *peculiaris*, one's own). Ecclesiastical law term for a parish or church that is not subject to the jurisdiction of the ordinary or bishop of the diocese. Some of these, like the Chapels Royal and Westminster Abbey, are royal peculiars under the direct control of the sovereign, while others were subject to the archbishop or to the greater abbeys. Before the Reformation there were about 300 such peculiars in England, but they have now been largely abolished. The court of peculiars is a branch of the court of arches. See Ecclesiastical Law.

Peculiar People. Protestant sect, founded in 1838 by John Banyard. Found mainly in Kent and the E. counties of England, their conspicuous tenet is their refusal to make use of medical treatment in case of sickness, and their reliance on prayer and anointing with oil to effect a cure.

Pedal Point. In music, a note that is sustained regardless of any changes of harmony especially in a figure. It is generally, but not invariably, in the bass and the notes customary for it are the tonic or the dominant, which may be used together, forming the so-called pastoral pedal. Owing to its frequent use in organ music the French term is *point d'orgue*.

Peddar Way. The traditional name for the best preserved Roman road in East Anglia. Traceable for 12 m. from near Ixworth, Suffolk, to Hookham Heath, Norfolk, it runs thence almost straight for 33 m. through Castle Acre to Ringstead. Here it turns and continues to the Roman camp near Brancaster. See Britain.

Peden, ALEXANDER (c. 1626–86). Scottish Covenanter. He became minister of New Luce, Galloway, in 1660, was ejected 1662, and thereafter won a reputation as a wandering preacher-prophet. He visited Ireland, was imprisoned on the Bass Rock, 1673–78, and died at Sorn, Jan. 28, 1686. Buried at Auchinleck, his body was disinterred by dragoons and buried again at the foot of the gallows at Cumnock. See Covenanters.

Pedestrian Crossing. Passage across a road at which pedestrians who wish to cross have certain rights over the vehicular traffic. Pedestrian crossings in Great Britain are marked off with rows of studs on the road surface, and are of two kinds, controlled (i.e. by traffic-lights or a policeman) and uncontrolled; the latter are marked by Belisha Beacons (*q.v.*). At uncontrolled crossings the pedestrian



Pecten. Marine bivalve

has a legally established right of way over vehicular traffic, which by [the Pedestrian Crossing Places Regulations, 1934, is compelled to approach the crossings in such a manner that it can stop to allow a pedestrian free passage across the road.

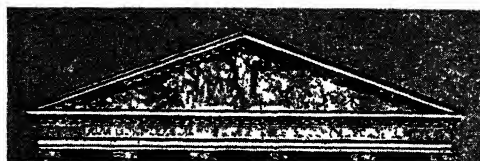
Pedestrian crossings were introduced into the U.K., 1934, by L. Hore-Belisha (*q.v.*), then minister of Transport. Similar crossing-places existed earlier in Paris and elsewhere. In Melbourne since 1925, and in New York, Germany, and the Scandinavian countries, pedestrians are liable to punishment if at controlled crossings they cross in defiance of traffic-lights or policeman.

Pedestrianism (Lat. *pedestrus*, going on foot). Art of walking. It may be regarded as including walking races over relatively short distances, in which the competitor matches his speed, staying power, and judgement against other competitors; and long distance walks, lasting many days, in which the competitors match themselves against the clock. Of the latter type the outstanding performer was Robert Barclay (*q.v.*). Rules, records, etc., applying to race walking will be found under Walking.

Pediculosis. Affection of the skin caused by the presence of the louse. These animals are insects of the order Anoplura and are exclusively parasites of mammals. There are two genera found on man: *Pediculus humanus*, which has two races, the head and the body louse, named *capitis* and *corporis* respectively; and *Phthirus pubis*, the crab louse. The eggs are laid in small capsules or nits on the hairs of the head or body and are difficult to remove. The lice pierce the skin of the host and draw blood, producing an irritation which may cause scratching and dermatitis and impetigo. The main danger from the louse is that it transmits typhus.

The most effective means of control is by the use of D.D.T. preparations in the form of a dust. This method does not affect the eggs, so a second application may be necessary to kill the young larvae as they emerge. The use of garments impregnated with D.D.T. is even more effective, since the power of killing lice is retained for some weeks after washing. This method was used by British forces during the Second Great War. Derris root also kills eggs.

Pediment (formerly periment, perhaps a corruption of pyramid). In classic architecture, the trian-



Pediment of the Panthéon, Paris

gular crown of a portico at the front or rear of a building. The space within the triangle is called the tympanum (*q.v.*), and is often filled with sculpture. The term is also used of similar formations over doors and windows. In Gothic architecture the height of a pediment equals, or exceeds, its breadth, and it is then known as a gable (*q.v.*). Otherwise, the ordinary pediment is enclosed by the long horizontal line following that of the cornice and two raking lines of equal length meeting above it. See Architecture.

Pediment. In geology, a gently sloping, smooth rock floor, which may or may not be covered with a veneer of sand or rock fragments and which occurs at the foot of steep mountain ranges in deserts. Isolated rock masses which have escaped the general planing down processes of erosion may rise from the pediment as steep-sided hills referred to as inselberge.

Pedipalpi. Order of creatures of the class Arachnida, phylum Arthropoda. It consists principally of the whip-scorpions, which differ from the true scorpions in having the head and thorax combined, as in the spiders, from which they differ, however, in having the abdomen segmented. The feelers (*palpi*) are more or less developed into nippers (*chela*). The first pair of legs are much longer and more slender than the others. There are no poison glands. The animals are found in damp situations in the hotter parts of the world. They are insect-feeders.

Pedlar. General term for an itinerant vendor of small wares. The word is of uncertain origin, but may be connected with the old and still colloquial *ped*, a basket. In the U.K. a pedlar is one who sells goods, or his skill in handicraft, *e.g.* tinkering, chair-mending, etc., on foot, without a horse or ass, being thus statutorily distinguished from a hawker, who uses a horse. A pedlar has to obtain annually a certificate from the police. The term pedlars' French is applied to the secret jargon of thieves and vagabonds, and so to any meaningless rigmarole.

Pedometer. Instrument for estimating distance traversed on

foot by counting steps taken. It comprises (1) a pendulum which swings with each forward movement of the leg to which the pedometer is attached;

and (2) a train of wheels actuated by a pawl on the pendulum. The amplitude of the pendulum swing must be adjusted to suit the normal stride of the wearer, and this is effected by a micrometer screw limiting the swing. The instrument is usually watch-shaped, and has dials indicating miles, tens and hundreds, besides a main dial calibrated in yards. For short distances its readings are very approximate, but for longer ones it is a useful means of measuring routes, as in military surveying, or in map-making.

Pedro (1334-69). King of Castile, called the Cruel. Son of Alphonso XI, he was born at Burgos, Aug. 30, 1334. By his many crimes, including the torture of his treasurer, Samuel Levi, and the murder by his own hand of Abu Said, usurping king of Granada, and by the suspicious circumstances of his wife's death, he incurred the hatred of his subjects; and his illegitimate brother, Don Enrico, known as Henry of Trastamare, invaded Castile with the assistance of French bands commanded by Bertrand du Guesclin. Pedro fled to Bayonne, where he obtained the help of Edward, the Black Prince. The Castilian and English troops were victorious at the battle of Navarrete in 1367, but after the Black Prince's departure Don Enrico returned and killed Pedro in a quarrel, March 23, 1369.

Pedro I (1798-1834). Emperor of Brazil, 1822-31. He was son of John VI of Portugal, and on his father's return from Brazil to Portugal, 1821, was left as prince-regent of the former country. Joining the party demanding independence, he was proclaimed emperor in 1822, and in 1825 the independence of Brazil was recognized. On the death of his father in the following year he became king of Portugal, but at once abdicated in favour of his daughter, Maria. After an outbreak in Rio de Janeiro he abdicated the Brazilian throne, April 7, 1831, and returned to Portugal.

Pedro II (1825-91). Emperor of Brazil, 1831-89. He was born at Rio de Janeiro, Dec. 2, 1825, son of Pedro I, and was proclaimed emperor on his father's abdication, 1831. The empire settled down to a

long period of peace under him until he was dethroned after the revolution of 1889, when he retired to Europe. He died in Paris, Dec. 5, 1891. In 1921 the remains of Pedro II and his wife were taken to Rio de Janeiro for re-interment. A study by M. W. Williams was published in 1938.

Peebles. Royal and mun. burgh and co. town of Peeblesshire, Scotland. It stands on the river Tweed,



Peebles arms

23 m. S. of Edinburgh by rly. Anciently a residence of the Scottish kings, Peebles occupies a well-sheltered position in the valley of the Tweed and attracts many visitors. Queensberry Lodging, which belonged to Lord Yester, was purchased in 1857 by William Chambers, who gave it to the town; through the generosity of Andrew Carnegie it was reconstructed and enlarged. The new buildings, reopened in 1912, contain the council chambers, town hall, library, museum, and art gallery. There are a hydropathic establishment and a good golf



Peebles, Scotland. Parish church, built in 1887

course. Tweed and woollen cloth are manufactured. Market day, Tues. Pop. 5,853.

Peeblesshire OR TWEEDDALE. Inland county of Scotland. Its area is 347 sq. m. From the valley of the Tweed, which has its source in the S.W. and traverses the entire breadth of the county E., the surface rises on each side in a succession of grass-clad hills scored by fertile valleys. In the S. there has been much afforestation. On



Peeblesshire. Map of this inland county of S. Scotland

the S. border is Broad Law (2,754 ft.), the highest summit in the county. The chief streams are the Biggar, Manor, Lyne, and Eddleston, all affluent to the Tweed. Peebles is a pastoral county, and sheep-rearing is a main occupation. British Rlys. afford transport facilities. Peebles is the county town. In conjunction with part of Midlothian one member is returned to parliament. Pop. 15,050.

LITERARY ASSOCIATIONS. The co. town claims several celebrated sons. William and Robert Chambers were born there; as also were Thomas Smibert (1810-54), poet and miscellaneous writer, editor of Chambers's Journal, 1837-42; John Veitch (1829-94), author of History and Poetry of the Scottish Border and poems inspired by Tweedside; and Henry Calderwood (1830-94), writer on philosophy. The county has been rich in writers of famous song. Robert Crawford (d. 1733), author of Tweedside and other well-known songs, lived at Auchinames. James Nicol (1769-1819), poet and miscellaneous writer, was born at Innerleithen. John Buchan (Lord

Tweedsmuir) was also a native of the co. Sir Walter Scott used the co. as a background for The Black Dwarf and St. Ronan's Well. It also inspired Thomas Tod Stoddart (1810-80) and J. C. Shairp in The Bush Aboon Traquair.

Peekskill. City of New York, U.S.A., in Westchester co. It stands on the E. bank of the Hudson, at the S. end of the Highlands, 41 m. N. of New York City, and is served by the New York Central rly. Known as the "largest village in the U.S.A." before becoming a city in 1940, it is finely placed, with Crugers Park and the Blue Mt. reservation of the Westchester state parks to the S. and Bear Mountain park, 4 m. N. on the opposite bank. Settled by the Dutch, 1667, it was burned by the British, 1777. Pop. 17,311.

Peel OR PEELE. In medieval architecture, a small tower or keep. They were found commonly on the borders of Scotland and Wales, and served as places of refuge for the inhabitants in case of raids.

Peel. Coast town and watering-place of the Isle of Man. It is 11 m. N.W. of Douglas, on the local railway. There are manufactures of sails, nets, boats, etc., but the people are principally engaged in the fisheries. Joined to the mainland by causeway is St. Patrick's Isle, which contains the ruin of Peel Castle, mentioned in Scott's Peveril of the Peak, and the remains of S. German's cathedral, a cruciform structure dating partly from the 12th century. Market day, Sat. Pop. 2,476.

Peel, WILLIAM ROBERT WELLESLEY PEEL, 1ST EARL (1867-1937). British politician. Eldest son of the 1st viscount Peel (v.i.), he was born Jan. 7, 1867, educated at Harrow and Balliol College,



Peel, I.O.M. View showing ruins of Peel Castle, mentioned in Scott's Peveril of the Peak



1st Earl Peel,
British politician

Oxford, and called to the bar in 1893. In 1900 he was elected to the L.C.C., becoming chairman in 1914. He was Unionist M.P. for S. Manchester, 1900-06, and for Taunton from 1909 until he succeeded to the viscounty in 1912. After active service in the First Great War he was appointed to the national service department in 1917, was under-secretary for War and Air, 1919, and chancellor of the duchy of Lancaster, 1921. Secretary for India, 1922-24 and 1928-29, he was on the India and Burma round-table conferences, presiding over the latter; was chairman also of the wheat commission, 1932, and the commission on Palestine, 1936. Advanced to an earldom in 1929, he died Sept. 28, 1937, and was succeeded by his only son, Arthur (b. May 29, 1901).

Peel, ARTHUR WELLESLEY PEEL, 1st Viscount (1829-1912). British statesman. Born Aug. 3, 1829, youngest son of Sir Robert Peel, he was educated at Eton and Balliol College, Oxford, and became Liberal M.P. for Warwick in 1865. He was parliamentary secretary to the poor law board, 1868-71; patronage secretary to the Treasury, 1871-73; and under-secretary for home affairs, 1873-74. In 1884 he was chosen Speaker, an office he held with distinction until 1895, when he retired, and was created a viscount. Chairman of the commission on



Arthur Wellesley Peel
Elliot & Fry

on licensing laws, 1896, he signed a minority report advising the reduction of the number of licensed houses, compensation being raised by a tax on them instead of on the general public; this proposal was ultimately the basis of legislation passed in 1904. Peel died Oct. 24, 1912, and was succeeded in the viscounty by his son William (v.s.), who became 1st earl Peel.

Peel, GERALD GRAHAM (1877-1937). British composer. Born at Pendlebury, Manchester, Aug. 9, 1877, and educated at Harrow and University College, Oxford, he became a pianist and composer of songs. The latter included In Sum-

mer time on Bredon, and other Songs of a Shropshire Lad (settings of A. E. Housman's poems); The Lute-Player; Kew in Lilac Time; and a song-cycle, The Country Lover. Peel died Oct. 16, 1937.

Peel, JOHN (1776-1854). English huntsman. Born at Caldbeck, Cumberland, Nov. 13, 1776, he died



John Peel, the Cumberland huntsman
From a print

there, Nov. 13, 1854, and is buried in the churchyard. He indulged a passion for fox-hunting for over 55 years, and is the hero of the song D'ye ken John Peel? written by John Woodcock Graves about 1828. *Consult Songs and Ballads of Cumberland*, ed. S. Gilpin, 1866; *John Peel*, J. M. Denwood, 1932.

Peel, SIR ROBERT (1788-1850). British statesman. He was born near Bury, Lancs, Feb. 5, 1788, the son of a wealthy cotton manufacturer, and was brought up in an atmosphere of intelligent Conservatism. He was educated at Harrow and Christ Church, Oxford, and after a brilliant university career entered parliament in 1809. At 24 he became secretary for Ireland; six years later he retired from the Liverpool ministry, but was chairman of the bank committee which carried the resumption of cash payments in 1819. In 1822 he returned to the ministry as home secretary and carried several valuable reforms, including a great reduction in the number of capital offences, improvements in the prisons, and the establishment of the Metropolitan Police, who received the popular appellations of Peelers and Bobbies after his names.

When Canning became prime minister in 1827, Peel and Wellington refused to join him, and

thenceforward Peel may be regarded as the leader of the Tory party in the house of commons. He joined the Wellington ministry, 1828, and supported the duke in passing Catholic emancipation, being convinced against his will of the necessity for that measure by the election of O'Connell for Clare. When Wellington in 1832 endeavoured to form a Tory ministry to pass a less drastic reform bill than that of Grey, the effort was made abortive by Peel's refusal to join; only after Grey's bill was passed did he accept it as an irrevocable *fait accompli*. In 1830 he had succeeded to a baronetcy, and he was M.P. for Westbury until 1833, then until his death for Tamworth.

Twice, in 1834 and in 1839, Peel was called to office as prime minister, but each time was obliged to resign after a few weeks; not till 1841 was he able to take office with a decisive Conservative majority behind him in the commons. For five years he was prime minister. He advanced in successive budgets along the path towards free trade upon which Huskisson had entered before him—on the principle of increasing revenue by reducing tariffs so that goods were cheapened and the demand for them increased, whereby an actual increase of revenue was attained. He taxed incomes over £150 a year, and carried in 1844 the Bank Charter Act. Irish Catholics were permitted to endow their own religion; and the boundary between Oregon and Canada was settled.

The Corn Law, however, was the grand problem—the problem of maintaining the prices deemed necessary for the preservation of the agricultural industry, and at the same time meeting the demand for cheap bread. Peel relied upon the sliding scale, but this proved a failure. Events were hurried by the rains of July, 1845, which "rained away the Corn Laws" and brought the potato blight. The Irish potato famine of 1845, coupled with the gradual working upon his mind of the arguments of the Anti-Corn Law League, convinced Peel that cheap bread was more necessary than the protection of agricultural interests.

Since the ministry had taken office as a protectionist government, Peel was unwilling himself to



Sir Robert Peel,
British statesman

introduce a measure repealing the Corn Laws, though he succeeded in persuading most of his colleagues in the cabinet of the necessity for the change. But a Whig or Liberal cabinet could not be framed, and Peel himself courageously introduced the measure which was supported by the Whigs and vigorously opposed by the no-surrender section of the Tory party. At the very moment when the bill for the repeal of the Corn Laws passed its final stage Peel was defeated in the house on an Irish question and resigned, June 29, 1846. The Liberals came into office and were there maintained by the general support of the Peelites, with whom they coalesced in 1852. Sir Robert, though outside the ministry, remained the most notable figure in the house until he died on July 2, 1850, from injuries caused by a fall from his horse. His statue is in Parliament Sq. See Corn Laws.

Bibliography. Speeches in the House of Commons, 4 vols., 1853; Memoirs, ed. Earl Stanhope and E. Cardwell, 1856; Political Life, T. Doubleday, 1856; Memoirs of Peel, F. Guizot, 1857; Lives, F. C. Montague, 1888; J. R. Thursfield, 1898; Peel from his Private Papers, ed. C. S. Parker, 1899; Life and Times, T. Lever, 1942.

Peele, George (c. 1558-98). English poet and dramatist. Son of a London silversmith, he was educated at Christ's Hospital and Broadgates Hall and Christ Church, Oxford. His court pastoral, *The Arraignment of Paris*, influenced A Midsummer Night's Dream, his historical play *Edward I*, Shakespeare's *Henry IV*, and his *Old Wives' Tale*, the theme of Milton's *Comus*. His works, which also include the scriptural *David and Bethsabe* and a number of pageants, possess poetic beauty, glow of fancy, and fervour of patriotism, but no high creative faculty. They were edited by A. H. Bullen, 1888.

Peenemünde. German research station on the Baltic coast, 60 m. N.W. of Stettin. Spread out among woods along a 4½-m. stretch of shore, the establishment specialised in aircraft, radiolocation, and armament development, being the most important centre of its kind in Germany. It was heavily bombed by the R.A.F., for the first time Aug. 17, 1943, when Gen. von Chamier-Glisenski and a number of other scientists were killed. An air photograph taken here, Nov. 8, 1943, showed an experimental flying-bomb on a landing ramp, confirming, with other air photographs, information,

already received in London through underground channels, of the production of pilotless air-planes. Peenemünde was occupied May 5, 1945, by the Russians, in whose zone of occupation it subsequently lay; the Russians continued experiments here.

Peeping Tom. Name given to the inquisitive tailor of Coventry who looked out on Lady Godiva, and hence applied to any idly inquisitive person. See Godiva.

Peep o' Day Boys. Organization of Protestant Ulstermen formed to resist the Catholic Defenders. They were so named from their habit of breaking into the houses of their victims at dawn. Their violence caused much trouble in Ulster, 1784-95. From 1790 many Peep o' Day Boys were absorbed in Orange lodges.

Peerage (Lat. *par*, equal). Literally, the body of peers. The word is now applied, however, to peers and members of their families, i.e. to those who can succeed to titles. In the U.K. there are five ranks in the peerage, duke, marquess, earl, viscount, and baron. Baronets have never been ranked as peers.

The possession of a peerage is confined to countries ruled by a monarch, because the root idea is that of personal service to him. Spain has had and Sweden has peerages like that of the U.K. Austria and Hungary had them before the First Great War. France had a peerage before the country became a republic. A peer of France was one on whom the king conferred that dignity, and from 1814 to 1848 there was a chamber of peers.

Originally a peer simply meant an equal, but its present use dates from the time it was restricted to the possessors of hereditary titles. This came about through the separation of the greater and lesser barons in the 13th century. The former, members of the house of lords, secured the right to be tried by their equals, or peers, and thus became known as peers. A peer and a member of the house of lords are not quite the same, as the bishops and the law lords are lords of parliament, but not peers. Peers are created by letters patent, prescribing the conditions under which a title may descend.

A peerage may be limited to sons and their descendants, or be extended, as was that of Earl Roberts, to daughters, or, as was that of Earl Kitchener, to a brother. The early peers owed their position to tenure of land, but this was soon superseded by a writ of

summons. There are peers of Scotland, whose numbers cannot be increased; peers of Ireland who can sit in the house of commons; and peers of the U.K. A woman can be a peeress, but does not sit in the house of lords. A peerage is said to be dormant when the heir does not assume the title. It becomes extinct when the heirs, according to the patent, fail. Baronies can fall into abeyance. A peerage cannot be created for life; but a lord of appeal in ordinary may be appointed for life. Proposals for reform of the house of lords in 1948 included suggestions that there should be power to create life peers and that the peeresses should be permitted to sit in the house, but these were not accepted. Peerages, or works giving biographical details of peers and their families, include those of Burke, Coke, and Debrett. There is also a Jacobite peerage. See Baron, Duke, etc.; Law Lord. Lords, House of; Title.

Peer Gynt. Dramatic poem by Ibsen, first published in 1867. Peer Gynt himself is one of the half mythical and fantastical personages from the peasant life of modern Norway, a typical man of indecision, ever afraid of doing the irretrievable. The work is alternately satirical, fantastic, and finely poetical. English translations have been made by Archer and Norman Ginsbury; and Ralph Richardson played the lead in a revival at the New Theatre, 1944. Grieg made the drama the theme of a well-known suite.

Peewit or **Pewit.** Either form is another, and onomatopoeic, name for a green plover. See Plover.

Pegasus. In Greek mythology, the winged horse which sprang from the blood of the Gorgon Medusa, when her head was struck off by Perseus. Pegasus created Hippocrene, the spring of the Muses, with a kick of his hoof, but his further connexion with the Muses, often alluded to in modern poetry, has not been traced earlier than the Italian poet Boiardo (d 1494). See Bellerophon.

Pegasus. In astronomy, one of the constellations. It is easily recognizable by the four stars which mark a great square, and is contiguous to the zodiacal constellations Pisces and Aquarius. The top left-hand corner of the square is not in Pegasus, but in the constellation of Andromeda. The others are Alpha, Beta, and Gamma Pegasus, whose ancient names were Markab, Scheat, and Algenib. The constellation contains a number of

variable stars, double stars, and a well-known stellar cluster.

Peggotty. Name of a family in Charles Dickens's novel *David Copperfield*. Clara, the devoted nurse of David, is always called Peggotty to distinguish her from Clara, David Copperfield's mother. Daniel Peggotty, her brother, is a great-hearted boatman, whose household, living in an old boat on Yarmouth beach, included his nephew Ham Peggotty, his niece Little Em'ly, and the forlorn Mrs. Gummidge.

Pegmatite (Gr. *pēgma*, anything fastened together). In geology, a rock of quartz and feldspar, etc., occurring in granites, etc., and having a coarse texture. Pegmatites occur as dikes or veins and often contain valuable minerals, e.g. garnet, beryl, boron, uranium, cerium, as well as oxide of iron. From them is obtained feldspar for porcelain ware, mica, etc.

Pégoud, ADOLPHE (1887-1915). French aviator. Daring in experiment, he was the first to fly upside down, at Juvisy, Sept. 1, 1913, and three weeks later he first looped the loop. Joining the French flying corps in the First Great War, he was killed near Belfort in an air battle, Aug. 29, 1915.

Pegu. Div., dist., and town of Burma. The div. comprises the lowland N.W. of the Gulf of Martaban, across the valley of the lower Sittang to that of the Irawadi above the delta. The dist. occupies the W. side of the lower valley of the Sittang, and rice is the sole crop. The town is on the Pegu river and is the rly. junction N.E. of Rangoon for the lines to Moulmein and Mandalay. It was formerly the capital of the Pegu empire, overthrown by Burma, 1757. Captured from British Imperial forces by the Japanese, Feb. 28, 1942, Pegu was retaken by the British 14th army, April 30, 1945, the Japanese making a stand there to guard their last escape route for motor transport from Lower Burma to Siam. Area, division, 13,258 sq. m.; district, 4,404 sq. m. Pop., division, 2,961,249; district, 582,959; town, 25,400.

Péguy, CHARLES PIERRE (1873-1914). French writer. He was born at Orléans, Jan. 7, 1873, and early became interested in social problems, publishing under the name of Pierre Deloire a treatise, *De la Cité Socialiste*, 1897. In the same year he collaborated with Marcel Baudoin in a poetic drama, *Jeanne d'Arc*. He later became director of a Socialist bookshop in Paris, and

agitated for a revision of the Dreyfus verdict. At his bookshop in the Rue de la Sorbonne he published *Les Cahiers de la Quinzaine* during 1900-14. His other works include *Le Mystère de la Charité de Jeanne d'Arc*, 1910; and *La Tapisserie de S. Geneviève et de Jeanne d'Arc*, 1913—mystical writings which much influenced his contemporaries. Péguy was killed in the battle of the Marne, Sept. 5, 1914. *Consulti Notre Cher Péguy*, J. and J. Tharaud, 1926; P. and Les Cahiers de la Quinzaine, D. Halévy (trans. R. Bethell), 1946.

Pegwell Bay. Inlet of the coast of Kent, England. It is 1 m. W. of Ramsgate harbour, and is famous for shrimps. Prominent features include the beacons marking the channel into Richborough harbour. A flat stretch below the chalk cliffs has been laid out as gardens. The bay formed the subject of a painting by William Dyce, exhibited in 1860 and purchased 1894 by the National Gallery.

Peiho or Haiho. River in Hopeh prov., China. It rises in the spurs of the Inshan Mts., and after an E. course it turns S.E. and, flowing to the W. of Peking, empties at Taku into the Gulf of Chih-li. The Peiho, with the other rivers that join it at Tientsin, 47 m. from its mouth, drains an area of 56,000 sq. m., which suffers from time to time from extensive floods. In 1901 the Chinese government undertook to improve conditions below Tientsin, and numerous works have been completed.

Peiping (Ch., northern peace). Name given by the Chinese to Peking (q.v.) during 1928-49.

Peipus or OZERO CHUDSKOE. Lake of N.W. Russia. It lies between Estonia S.S.R. and the Leningrad region of R.S.F.S.R., and is divided into three parts, Lake Peipus proper, Lake Pskov, and the so-called Warm Lake, a narrow channel connecting the two. Its total length is 90 m., and it discharges its waters into the Gulf of Finland by the Narova. In early times it formed the chief frontier between the Slavs and the Finnish Chuds, whence its local name, lake of the Chuds. Its fish is sold in local markets and in Leningrad. When the Germans invaded Russia on June 22, 1941, their armies advanced rapidly to the Stalin line, the right flank of which was protected by Lake Peipus. After fruitless attempts at forcing the line frontally, the Germans swung their left wing to advance on both sides of the lake. By the end of Aug. the Germans had gained con-

trol of Estonia and directly threatened Leningrad. Early in 1944 the Russians began an offensive against the Germans in Estonia, and by Feb. had passed Lake Peipus.

Peirithous. In Greek legend, king of the Lapithae (q.v.). He led his army to battle with Theseus, but on seeing each other the two leaders embraced, and thereafter became the firmest of friends. After taking Helen from Sparta, they descended into Hades to carry off Proserpine or Persephonē as a wife for Peirithous. They were seized by Pluto, from whom Theseus was afterwards rescued by Hercules, but Peirithous remained for ever in chains.

Peirse, SIR RICHARD EDMUND CHARLES (b. 1892). British air officer. Educated at Monckton Combe school, H.M.S. Conway, and King's College, London, he was commissioned in the R.N.A.S. in 1914, and received, 1915, the D.S.O. for attacks on German submarine bases at Ostend and Zeebrugge. In 1919 he received a permanent R.A.F. commission and was awarded the A.F.C. Deputy director of operations and intelligence 1930-33, he was appointed to command British forces in Palestine and Transjordan in 1933, becoming deputy chief of the air staff in 1937. In 1940 he became chief of Bomber Command, initiating the strategic bombing of German war industry. On March 5, 1942, he was appointed A.O.C.-in-C. India, and in Dec. commander of all Allied air forces in S.E. Asia. He was knighted in 1940 and retired from the R.A.F. in 1945.

Peisistratus or PISISTRATUS. Tyrant of Athens (560-527 B.C.). A kinsman of Solon, he at first supported his relative; but, being ambitious of power, allied himself with the "Men of the Mountains," the poorest and most dissatisfied class in Athens. Appearing one day in the market-place covered with blood, he declared that he must have an armed bodyguard.

The guard was voted to him by his supporters, and when it had increased from 50 to 400 men he seized the Acropolis and assumed the supreme power. Though twice driven out by opposing factions, by 545 he firmly established himself as autocrat of Athens. His rule was enlightened and beneficent and he was a generous patron of art and literature.

Pekan (*Martes pennanti*). Fishermarten, wood-shock, or black fox of N. America. It is a carnivorous mammal of the family *Mustelidae*, allied to the pine-marten and the



Pekan, the large North American marten

sable. It is the largest of the martens, the head and body measuring 2 to 2½ ft. and the tail 14 to 18 ins. It has a distinctly fox-like appearance, and is blackish brown in colour. Formerly plentiful throughout the U.S.A., it now occurs only in the N.E. It is found also in British Columbia.

Pekin. City of Illinois, U.S.A., the co. seat of Tazewell co. It stands on the Illinois R., 10 m. S.S.W. of Peoria, and is served by rlys. Built in a farming and coal mining area, it ships grain, maize, and coal, and manufactures flour, corn products, malt, cereals, and yeast. Lincoln practised law here. Pop. 19,407.

Peking (Ch., northern capital). Capital of China. It is situated 70 m. N.W. of Tientsin at an alt.

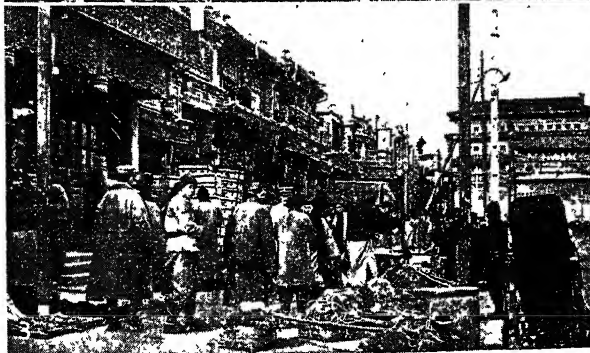
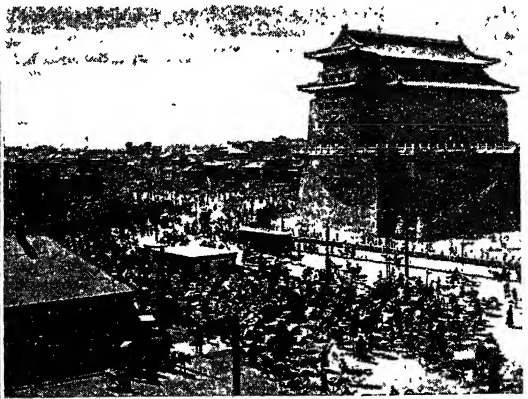
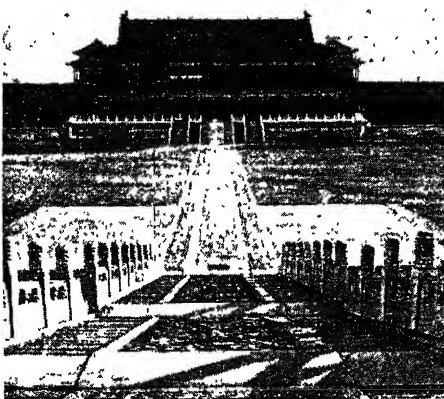
of 120 ft. and has an est. pop. of 2,000,000. The ancient capital of Yen, and then called Yenking, the town occupied a site to the S.W. of the present Tartar city, coinciding with part of the present Chinese city. After he had conquered N. China Kublai Khan built a new town on the site of the present Tartar city, and made it, 1264, capital of his Chinese empire. To this city the Chinese gave the name Taitu (great residence); the Mongols called it Khan Baligh (imperial city), the Cambaluc of Marco Polo.

In 1368 the first emperor of the Ming dynasty transferred his capital to Nanking (southern capital), and Taitu was renamed Peking or Peiching. In 1421 Peking again became capital of the whole country, and remained so until 1928 when the Nationalists from the South captured it and, removing the capital to Nanking, changed Peking's name to Peiping (northern peace).

Soon after the so-called China incident started in 1937, the Japanese occupied Peiping, Aug. 19, without a struggle, and there they set up a puppet govt. in Dec., which administered more and more of China as it came under Japanese control. The Japanese built a new residential and factory area to the W. of the old city.

After the Allies defeated Japan in 1945, Peiping remained in the hands of the Nationalists until they surrendered it to the Communists, Jan. 22, 1949. It was chosen capital of Communist China and reverted to the name Peking, Sept. 29.

The present walls of the Tartar city were built in 1421, and those of the Chinese city in 1544. The two cities are rectangular in shape. The outer walls, 24½ m. long, enclose many fields and woods; the wall of the Tartar city is 14 m. long, about 41 ft. high, 50 ft. wide at the top and 62 ft. at the base. It is pierced by nine gates, three of which lead to the Chinese city, which has seven additional gates. Inside the Tartar city is the imperial city, also contained within separate walls, 6 m. in length,



Peking, China. 1. The Hall of Supreme Harmony at the centre of the Forbidden City. 2. The Arrow Tower, one of the city's gateways. 3. Chi'en Mén Street. 4. Temple of the Happy Year, adjacent to the 15th cent. Temple of Heaven

while a moat and a brick wall in the centre of the imperial city mark off the so-called "forbidden city," in which are situated the imperial palaces and the pleasure grounds (including three lakes) of the winter and summer palaces. In the Tartar city are the municipal offices, as well as the old legation quarter.

Among the buildings of interest in Peking are the observatory, dating from the 13th century, the Lama temple, the temple of Confucius, and the hall of the classics. The Chinese city is the commercial section of Peking. It also contains the temple of heaven, 1421, and the temple of agriculture. Peking is connected by rly. with Hankow, on the Yangtse, and with Mukden via Tientsin; a third line runs N.W. to Kalgan and towards Kueihuaoheng.

Pekingese. English name for the lion dog of China. This was bred (possibly from a much larger dog of similar appearance used for hunting in the Chinese countryside) for the court in the Summer Palace of Peking, where it was jealously guarded. The sleeve dog, small enough to be carried in a mandarin's sleeve, weighed five lb. or less; the pillow dog weighed about 10 lb. Five lion dogs left behind by the court when it fled at the looting of the Summer Palace in 1860 were brought to the U.K., one being presented to Queen Victoria. A pair brought in and exhibited in 1896 started a lasting fashion for these hardy, individual, game little dogs. There are several Pekingese clubs. See Dog colour plate.

Peking Man. Popular name for *Sinanthropus Pekinensis*, a skull found at Choukoutien, 37 m. S.W. of Peking, China, on Dec. 2, 1929 by a group of Chinese and American anthropologists working for the Rockefeller foundation. The skull dates from the Pleistocene period (*q.v.*), and is of a creature midway between the orang utan and man. The brain development appears to have been greater than that of the Trinil (*q.v.*) skull, and the brain case is considerably thinner than that of the Piltdown (*q.v.*) skull. The Peking skull, taken to Tokyo university as loot during the Japanese occupation of China, was later returned to the national geographical survey society of China. See Man.

Pelagic Animals. Those marine animals which swim or float freely in the surface waters or lower depths without being attached to weeds or rocks. The

term is chiefly used for the teeming, often transparent creatures on which larval fishes feed.

Pelagic Deposits. Deposits found in oceanic depths and derived from the remains of plankton. Skeletons form globigerina, radiolarian, and other types of deep-sea ooze beyond the limit where material derived from the land can be deposited. Associated with the oozes of organic origin is the Red Clay, which is the insoluble residue of wind-borne dusts, meteoric dust and particles, sharks' teeth, and whales' carbones.

Pelagius (c. 360-420). British theologian. When first heard of he was living as a studious recluse at Rome. Thence in 410 he was driven by the Goths to Africa. He also visited Palestine. An earnest student of earlier literature, Greek and Latin, pagan and Christian, he gradually came to hold views which brought him into conflict with some of the greatest writers of the day, *e.g.* Augustine and Jerome. He was acquitted of heresy in 415, but after death was excommunicated, 431.

Pelagianism taught that sin was not transmitted from Adam down through the human race, but that each child born into the world was morally clean; that if he sinned he did it by the force of example; that it was possible for him not to sin; and that for all his good deeds he accumulated merit with God. These views were c. A.D. 409 embodied in a commentary on the Epistles of S. Paul in Latin, the original form of which was discovered in 1906—the oldest surviving book by a British author.

Pelargonium.

Genus of flowering and ornamental-foliaged plants, including half-hardy succulent and shrubby perennials of the family Geraniaceae. A notable section of the *Pelargonium* family is miscalled geranium (*q.v.*) by gardeners. Most pelargoniums

are natives of S. Africa, a few of Australia, and they were introduced into Great Britain at different dates from 1632.

Pelagians. Name loosely given to the people who inhabited ancient Greece before the arrival of the Achaeans (*q.v.*). Their exact identity is uncertain. Probably they were of Mediterranean type, a dolichocephalic or long-skulled

dark people of a kind still found in many parts of Europe and N. Africa.

Pelée, MONT. Volcano in Martinique, French West Indies. Small ebullitions had been recorded in 1762 and 1851, but in 1902 and 1929-32 violent eruptions occurred. They were accompanied by the explosive emission of glowing clouds which poured down the mountain sides, burning everything in their paths. On May 8, 1902, one such cloud completely destroyed the city of St. Pierre, killing 30,000 people. During this eruption the viscous lava of the volcano was forced slowly from the crater in the form of a great spine or obelisk which rose to a height of 800 ft. above the crater rim. The spine rapidly weathered and collapsed. In 1929-32 the lava formed a dome-shaped mass (tholoid), the top of which rose above the general level of the crater.

Peleus. In Greek legend, king of the Myrmidons in Thessaly, and father of Achilles. His wife was Thetis, a sea-deity, daughter of Nereus. Their wedding was of great magnificence, all the gods being invited, except Eris, the goddess of Discord.

Pelew OR PALAU. Group of islands in the Pacific lying E. of the Philippines and W. of the Carolines; they consist of 26 islands, mostly of coral, covering 170 sq. m. Formerly belonging to Germany, after the First Great War they were placed under a Japanese mandate. Japan later used them as air and naval bases. For administrative purposes the

group became known as the W. Carolines. They yield phosphate, copra, bêche de mer, and turtle shell. Pop. 12,802.

On March 30, 1944, U.S. warships and aircraft attacked shipping and installations on the islands, further attacks being made later in the year. After a

three-day intensive bombardment from sea and air, U.S. Marines landed on Peleliu on Sept. 15, meeting fierce Japanese opposition. On Sept. 17, a further landing was made on Anguar, which was captured after three days. Troops took Garakayo in Oct. and by the middle of that month the Americans were in occupation of ten of the individual



Pelargonium. Flower cluster of this decorative plant

islands and in virtual control of the whole group, although the Japanese regained possession of Ngerengong on Nov. 13. The garrisons still resisting in the Pelews were among the Japanese forces whose surrender was received at Truk on Sept. 2, 1945.

Pelham, HENRY (c. 1696–1754). British statesman. Younger son of Thomas Pelham, made Baron Pelham in 1706, he was educated at Westminster and Hart Hall, Oxford. His eldest brother was Thomas Holles-Pelham, who became duke of Newcastle, and the two were inseparably associated in public life. Henry became M.P. for Seaford, 1717, and in 1721 a lord of the Treasury under Walpole. From 1722 he sat for Sussex continuously. In 1724 he was made secretary of War, and in 1730 paymaster of the forces. In 1743 he became prime minister and chancellor of the exchequer. During his term of eleven years, he followed the policy of Walpole, economy at home and peace abroad; but he lacked force and had to maintain his position by corruption. He died March 6, 1754. See Newcastle, Duke of.



Henry Pelham, British statesman

Pelican (*Pelecanus*). A small genus of about eight species of large birds. Their extended wings measure from 10 ft. to 15 ft. between their tips. The hind toe is turned forward and united by a web to the other three. They eat fish, which they seek in shallow waters of rivers and lakes, and the structure of the bill and neck is well adapted to the capture of



Pelican. The white species of this bird

such prey, the long upper mandible being hooked at the tip, and the lower mandible carrying a large pouch formed by the loose, naked skin of the neck. When the bag is full, the bird retires to a rock to consume the contents, or to the nest, where the young feed themselves by thrusting in head and neck. The nest, with two white eggs, is placed on the ground among reeds. The genus is found in Europe, Asia, Africa, and America.

Pelion. Mountain range of ancient Greece. It is in the Thessalian district of Magnesia, near the coast, S.E. of Mt. Ossa. It is famous in Greek mythology as the scene of the conflict between the gods of Olympus and the giants, who are said to have piled Pelion and Ossa on Olympus to reach the sky. Pelion was also the reputed home of the centaur Chiron (*q.v.*).

Pelissier, AIMABLE JEAN JACQUES, DUC DE MALAKOFF (1794–1864). French soldier. Born Nov. 6, 1794, he succeeded Canrobert as commander-in-chief in the Crimea, 1855. Having directed the siege and capture of Sevastopol, he was made marshal of France and duc de Malakoff. Ambassador in London, 1858, he returned to Algeria as governor in 1860, and died there, May 22, 1864.

Pelissier, HENRY GABRIEL (1874–1913). British comedian. Son of a London diamond merchant, he belonged to a family of French origin. He was educated at a Society of Friends' school at Scarborough. Studying music first in a somewhat casual fashion, he began to write songs, and soon became known as an entertainer. He established the troupe of players called the Follies (*q.v.*). Pelissier was the first husband of Fay Compton. He died Sept. 25, 1913.

Pelitic Rocks. Rocks which are, or have been, composed chiefly of clay and impurities. Examples are slates, mica schists, and shales. See Clay.

Pella. Ancient town of Macedonia. It was situated 21 m. N.W. of the mouth of the Axios (Vardar). The birthplace of Alexander the Great, it was the last capital of the kings of Macedonia.

Pellagra (Ital. *pelle*, skin; *agra*, rough). Endemic disease occurring almost universally, but rare in Gt. Britain. It is commonest where maize is the staple diet, among those who eat little protein. The cause is a deficiency in the diet of factors in the vitamin B complex, chiefly riboflavin and nicotinic acid. This



Pelion, Greece. The mountain range and the town of Volo

deficiency may occur in chronic alcoholics. The disease generally begins with the appearance of pigmented patches on the backs of the hands, which are at first taken for sunburn. This may be associated with a mild degree of sore throat, diarrhoea or constipation, and giddiness. These patches disappear in a week or two and the skin underneath then appears normal, or perhaps whiter than the adjacent skin. Loss of weight and nervous symptoms occur. After a year or more there is probably a return of symptoms in a more severe form. The treatment consists of adding to the diet red meat, milk, eggs, liver, fresh fruit, and vegetables, and brewers' yeast.

Pellegrini, CARLO (1839–89). An Italian caricaturist. Born at Capua, he served in Garibaldi's army, came to England in poor circumstances in 1865, and became caricaturist to Vanity Fair. Between 1869 and his death he contributed hundreds of portraits of notabilities to that journal over the signatures Singe or Ape. He died in London, Jan. 22, 1889.

Pelletier, MARY EUPHRASIA (1796–1868). French saint. Rose Virginie Mourain was born at Noirmoutier, Vendée, July 31, 1796. She was educated there by Ursuline nuns, and in 1814 entered a convent at Tours, of which she became superior in 1825. She founded houses of refuge known as Homes of the Good Shepherd at Angers, Poitiers, and Grenoble, and in 1841 established foundations in Paris and London. By 1855 these homes had been extended throughout Europe. She died at Angers, April 24, 1868, was beatified in 1933, and canonised May 2, 1940.

Pelletierine. Liquid alkaloid contained in the bark of the pomegranate (*Punica granatum*). Pelletierine tannate, a mixture of tannate salts of the alkaloids of the bark, is a remedy for tape-worm.

Pellico, SILVIO (1788-1854). Italian poet, dramatist, and patriot. He was born at Saluzzo, Piedmont, June 24, 1788. Having edited a paper which was suppressed by the Austrians owing to its liberal opinions, he was suspected of association with the Carbonari, was arrested on Oct. 15, 1820, and in 1822 sentenced to death, but the sentence was commuted to 15 years' imprisonment. He was released under the amnesty of 1830, and wrote a simple narrative, *Le Mie Prigioni*, 1832, the publication of which caused something of a sensation. It was translated into English by T. Roscoe, 1833, as *My Ten Years' Imprisonment*, and remains Pellico's best known work. He wrote also a number of plays and poems, the most successful being his tragedy, *Francesca da Rimini*, 1818, which won the admiration of Byron. He died Jan. 31, 1854. *Consulti* Life. I. Rinieri, 1899-1901.



Silvio Pellico

of 1830, and wrote a simple narrative, *Le Mie Prigioni*, 1832, the publication of which caused something of a sensation. It was translated into English by T. Roscoe, 1833, as *My Ten Years' Imprisonment*, and remains Pellico's best known work. He wrote also a number of plays and poems, the most successful being his tragedy, *Francesca da Rimini*, 1818, which won the admiration of Byron. He died Jan. 31, 1854. *Consulti* Life. I. Rinieri, 1899-1901.

Pellitory (*Parietaria officinalis*). Perennial herb of the family Urticaceae. It is a native of Europe and Asiatic Russia. From a short, woody rootstock, usually between the masonry of old walls, rounded reddish branching stems arise, with alternate oval or lance-shaped, downy leaves. The tiny greenish flowers are produced in short sprays from the base of the leaf-stalks. Under the influence of sunshine, or slight irritation, the anthers explode and little clouds of pollen are seen.

Pells (Lat. *pellis*, skin). Old name for sheepskins. When prepared, the records of the exchequer were written thereon in early days. The clerk of the pells was an official who kept a record of all monies entering and leaving the exchequer. The office was abolished in 1834. *See* Exchequer.

Pelopidas (d. 364 B.C.). Theban general and statesman. In 385 B.C. Epaminondas (q.v.) saved his life in a battle with the Spartans near Mantinea, and the two became devoted friends. It is said that Pelopidas, though a man of wealth, adopted a simple life in order that Epaminondas, who was a poor man, might be able to associate with him on equal terms.

By 379 Pelopidas had liberated his native city from its Spartan garrison, and he took a leading part

in the subsequent struggle with Sparta. He did invaluable service with his Sacred Band, a picked body of Theban youths. During the latter part of his life he engaged in expeditions in the North against Alexander, the tyrant of Pherae, and also went on an embassy to the Persian king. In 364 he again came into conflict with Alexander of Pherae, and after the victory of Cynoscephalae met his death while impetuously endeavouring to kill his old enemy with his own hand.

Peloponnesse or **PELOPONNESUS** (Gr. island of Pelops). The S. portion of Greece, also called Morea. It is connected with the N. portion by the isthmus of Corinth. Its original inhabitants were Pelasgians, who were overrun successively by Achaeans and Dorians. Anciently it was divided, mainly by its mt. ranges, into seven states, Achaea, Corinthia, Elis, Argolis, Messenia, Laconia, and Arcadia, all of which had a seaboard except Arcadia. *See* Greece; Sparta.

Peloponnesian War. Name of the war between Sparta and Athens, in which nearly all the rest of



Pellitory. Leaf-stalk with flowers. Inset, flowers surrounded by bracts

Greece was involved. It lasted 431-404 B.C.; its ostensible cause was the quarrel between Corcyra and its mother city Corinth, in which Athens supported the former and Sparta the latter. In reality, it was a struggle between the democratic Ionians of Athens, the islands, and the maritime towns, and the oligarchical, continental Dorians, represented by Sparta.

It may be divided into three periods. (1) The Archidamian War (431-421), so named from Archidamus, king of Sparta, who commanded the forces against Athens. In this the honours of war were equally distributed. The chief incidents were the plague at Athens, the capture of Sphacteria, the defeat of Cleon by Brasidas, and the heroic resistance of the Plataeans under siege. The peace of Nicias arranged a cessation of hostilities for 50 years, but it only

lasted five months. (2) 421-412. This period was marked by the transference of the seat of war to Sicily, the result of which was the disastrous Sicilian expedition, instigated by the ambition of Alcibiades. (3) The Decesean War (412-404), so called from the occupation of Decesea, 14 m. N.E. of Athens, by the Spartans.

The scene of interest lies mainly in the East. The exile of Alcibiades caused him to take the side of the enemies of Athens, and the king of Persia intervened on the side of Sparta. The decisive victory of Aegospotami enabled Lysander to capture Athens in 405, with the result that the "long walls" were destroyed, her navy burnt, and her colonies lost. The effect was to confer the temporary hegemony of Greece upon Sparta. There is no doubt that the importance of the war has been exaggerated, owing to the detailed account given by Thucydides, and that it had little effect upon the general history of the world. *See* Greece: History.

Pelops. In Greek legend, the son of Tantalus, king of Phrygia. Being expelled from his native country, he migrated to Pisa, where he became king. He was said to have been killed by his father, and his flesh put before the gods to eat at a banquet. Hermes, however, restored Pelops to life. At Pisa he became one of the suitors of Hippodamia, daughter of King Oenomaus, the condition of winning her being that he should enter for a chariot race with her father, in which unsuccessful competitors were put to death. Pelops won the race by bribing Myrtilus, the king's charioteer, to remove the lynch-pin from his master's chariot wheel. When Myrtilus subsequently claimed the reward promised, Pelops threw him into the sea. As he disappeared Myrtilus cursed Pelops and all his house. This curse caused the succession of tragedies among the descendants of Pelops, such as the crimes of Atreus and the murder of Agamemnon.

Pelorus Jack. Local name bestowed on a grampus (q.v.) that was in the habit for years of accompanying vessels through French Pass, between Wellington and Nelson, New Zealand. Travelers looked for it eagerly, and the Maori regarded it as a friendly



Pelops, legendary king of Pisa. British Museum

minor deity. The legislative council passed a resolution for its protection. The name was derived from Pelorus Sound, where it usually picked up vessels. It was probably not an individual but a succession of grampuses, as these cetaceans frequently follow ships.

Pelota (Lat. *pila*; Span. *pella*, ball). Ball game played in Spain and Spanish America with the cesta, or curved basket attachment for the right hand. The game originated with the Basques of France, and was imported into Spain in 1858, hence Pelota Basque or Vasca, though the game is known in Spain as *el bñe á cesta*, or basket play. The hard ball weighs 120 grammes (about 4 oz.), is made of rubber and wire, and is covered with leather. It is struck violently with the cesta against two walls of cement at right angles, known as the frontón and the pared respectively, in much the same way as in the English game of fives (*q.v.*). The rules are numerous and complex, and played by teams of skilled professionals, three aside, it is an exciting game.

Pelotas. Town of Brazil, in the state of Rio Grande do Sul. It stands near the Lagoa dos Patos (*q.v.*), 25 m. by rly. N.W. of the town of Rio Grande do Sul, and is a junction for São Lourenço. It is a commercial centre for coastal trade, and has flour mills, soap and glass factories, and exports preserved meats, hides, tallow, and horns. It was formerly known by the name of São Francisco de Paulo. Pop. est. 60,000.

Peltasts. Type of light-armed foot soldier of ancient Greece. They bore a spear of moderate length, and took their name from the *pelta*, a crescent-shaped shield with rounded ends. The peltasts were a lighter arm than the hoplites, who bore a long spear and sword, and wore helmet, breastplate, and circular shield.

Peltier Effect. Difference in electrical potential developed when two metals are placed in contact and heated. Advantage of this effect is taken in the measurement of temp. by means of a thermocouple, in which two wires of different metals or alloys are connected at two places. If one of these junctions is kept at a constant low temperature and the other junction heated, then the electromotive force produced is proportional to its temperature. See Pyrometry; Thomson Effect.

Pelvis (Lat., basin). Bony girdle which connects the trunk with the lower extremities, sup-



Pelota. Players in the Spanish ball game, before the frontón wall. Inset, the cesta or basket attachment with which the ball is struck



ports the weight of the body, and contains the pelvic viscera. The pelvis consists of the two innominate or hip bones, one on each side, which meet in front, and are separated behind by the sacrum, terminating in the coccyx.

According to anatomists, the pelvis is divided by a plane which passes through the promontory of the sacrum and the upper border of the junction formed by the pubic bones. The upper part of the pelvis is sometimes spoken of as the false pelvis, and the lower part as the true pelvis, the line between them forming the brim or inlet of the pelvis, while the space between the inferior terminations of the constituent bones forms the outlet of

coloured granite and gneiss and covered with numerous glaciers, it has the form of a horse-shoe open to the E. Mont Pelvoux, 12,945 ft. alt., is one of the highest peaks of the Alps.

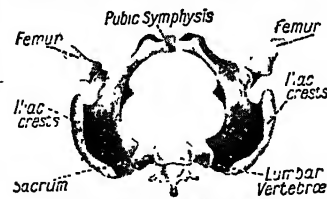
Pemba. Island situated off the coast of Tanganyika Territory, Africa. It is a British possession, 35 m. N.E. of the island of Zanzibar. Of coral formation, it has an area of 372 sq. m., and is divided into three dists., Weti, Chake-Chake, and Mkoani. It is administered by the Zanzibar government. The chief products are cloves, copra, and rubber. Pop. est. 100,000 See Zanzibar.

Pemba Bay or **POMBA BAY.** Bay on the coast of Mozambique. About 120 m. N. of Mozambique town, it is one of the finest harbours in the world. Its area covers 40 sq. m. On the shores is the settlement of Porto Amelia (*q.v.*).

Pemberton, SIR MAX (1863-1950). British author. Born at Birmingham, June 19, 1863, he went to Merchant Taylors' and Caius College, Cambridge. He published his first novel, *The Diary of a Scoundrel*, in 1891. He edited *Chums* 1892-93, and *Cassell's Magazine* 1896-1906. His first notable story was *The Iron Pirate*, which ran as a serial in *Chums*, 1893, followed by others of the same kind,



Sir Max Pemberton, British author Elliott & Fry



Pelvis (male), seen from above

the pelvis. Fracture of the pelvis is a frequent condition in modern warfare and in motor and other accidents. It is always dangerous and tedious to cure. The measurements of the pelvis are of great importance in childbirth, and X-rays are used to assist prognosis. The pelvis is wider in woman than in man.

Pelvoux. Mountain group of France. It is on the frontiers of the depts. of Isère and the Hautes-Alpes, and is bounded by the valleys of the Romanche, Drac, and Durance. Composed chiefly of rose

Sea Wolves, 1894, and Kronstadt, 1898. Among other works were *The House Under the Sea*, 1902; *Captain Black*, 1911; *Prince of the Palais Royal*, 1921; *The Mad King Dies*, 1928. He wrote also a memoir of Northcliffe, 1922; *Life of Sir Henry Royce*, 1934; and his own memoirs, *Sixty Years Ago and After*, 1936. For the theatre he provided light entertainment with *The Dancing Master*, *The Finishing School*, *Lights Out*, *The Bells of St. Valoir*, and (in collaboration) *My Lady Frayle*, and *Hello, Ragtime*. A director of *Northcliffe Newspapers*, he was knighted in 1928. He died Feb. 22, 1950.

Pembroke. Mun. borough, seaport, and market town of Pembrokeshire, Wales. The name is a

corruption of Penfro, a peninsula in the neighbourhood. It stands on the S. side of Milford Haven, 42 m. W. of Swansea, and is served by rly. The borough

includes Pembroke Dock (*q.v.*). The chief objects of interest are S. Mary's Church, with an old and massive tower; the remains of a Benedictine house, Monkton Abbey; and the castle, in which it is said Henry VII was born, and which remains in a good state of preservation. Underneath the keep is the Wogan, a large cave leading to the shore. Monkton Abbey church is still used.

A castle was built at Pembroke about 1100, and as the seat of powerful earls the town became important. It was the county town and the chief port for communication with Ireland. It began to decline after Tudor times, but prosperity revived when Pembroke Dock was established. Market day, Sat. Pop. 12,008. Pembroke is also the name of a suburb of Dublin.

Pembroke. Town of Ontario, Canada. It stands on Lake Alouette, a widening of the Ottawa river, 220 m. W. of Montreal; and is served by the C.P.R. and C.N.R. Industries include lumber mills, sawmills, brickyards, and tanning. Algonquin national park lies 12 m. W. Pop. 11,159.

Pembroke, EARL OF. British title held by the family of Herbert. In the Middle Ages, as Pembrokeshire was a palatine county, it was an important office. The first earl was Gilbert de Clare, created in 1138, and the second his son Richard, known as Strongbow. In 1176, on Strongbow's death, it

passed to his son-in-law, William Marshal (*v.i.*). The Marshal earls held it until 1245. When the family became extinct William de Valence secured the earldom by marriage, but his male line failed in 1324. Humphrey, duke of Gloucester, and Jasper Tudor held the title.

In 1408 Sir William Herbert was made earl of Pembroke, but his son William exchanged it for another title. In 1551 another Sir William, of an illegitimate branch, was made earl, and the title has since been held by his descendants. The 3rd earl, separately noticed, was the one whose name is associated with Shakespeare. Philip, 4th earl, was in 1605 made earl of Montgomery, and later earls have since borne the double title. In 1913 Reginald Herbert (b. Sept. 8, 1880) became 15th earl. His chief seat is Wilton House, near Salisbury, and his eldest son is called Lord Herbert.

Pembroke, WILLIAM MARSHAL, 1ST EARL OF (c. 1146-1219). English statesman. Second son of John le Marechal, he was knighted in 1173, after being for some years a member of the household of Henry, the eldest son of Henry II. In this capacity, till the prince's death in 1183, Marshal figured prominently in the quarrels between the king and his sons. He married Isabel de Clare, an alliance which brought him the earldoms of Pembroke and Striguil. He was among those who persuaded John to sign the Great Charter. On the king's death (1216) he became regent, and held that office till his own death, May 16, 1219. He was buried in the Temple Church, London. *Consult* Life, T. L. Jarman, 1930.

Pembroke, AYMER DE VALENCE, EARL OF (c. 1260-1324). English soldier. He succeeded his father William, a half-brother of Henry III, as earl of Pembroke in 1296. On the death of Edward I, 1307, he was for a short time guardian of Scotland, filling the same position again in 1314. He took an active part against Piers Gaveston, whom he captured at Scarborough, 1312. Pembroke held a command at Bannockburn, 1314, was guardian of England during the king's absence, and one of the judges who sentenced Lancaster to death. He died at Compiègne, June 23, 1324.

Pembroke, MARY HERBERT, COUNTESS OF (1561-1621). Fourth daughter of Sir Henry and sister of Sir Philip Sidney. She was born at Ticknell Palace, Bewdley, Oct. 27, 1561. In 1577 she became the third wife of Henry Herbert,

2nd earl of Pembroke. One of the most learned women of her time, and a patroness of Spenser, Daniel, Breton, Jonson, and other poets,



Mary Herbert,
Countess of
Pembroke

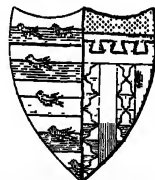
she is said to have made Wilton House (*q.v.*) like a college. Sidney wrote his *Arcadia (q.v.)* for her; and she edited, revised, extended, and published the first printed edition of that

work. She translated *A Discourse of Life and Death* from the French of Plessis du Mornay. She died Sept. 25, 1621, and was buried in Salisbury Cathedral; she was the subject of the famous epitaph "Underneath this sable hearse," attributed to both Jonson and Browne of Tavistock. *Consult* Life, F. B. Young, 1912.

Pembroke, WILLIAM HERBERT 3RD EARL OF (1580-1630). English politician, born at Wilton, April 8, 1580. He had Samuel Daniel as tutor before going to Oxford university, where Pembroke College is named after him. He succeeded to the title in 1601, and soon was in disgrace over an intrigue with Mary Fytton. He became lord chamberlain to James I, held office under Charles I, and was chancellor of Oxford. A poet, he is described by Aubrey as the greatest Maecenas to learned men of any peer of his time. To him and his brother Philip, "incomparable pair of gentlemen," the Shakespeare First Folio was dedicated, and he has been doubtfully identified with the Mr. W. H. to whom Shakespeare's sonnets are addressed. He died at Wilton, April 10, 1630. *See* Shakespeare.

Pembroke College. One of the colleges of the university of Cambridge. It was founded in

1347, in memory of her husband, by Mary, widow of Aymer de Valence, earl of Pembroke, and daughter of Guy, count of Chatillon and St. Pol. Known as Pembroke



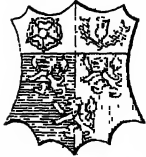
Pembroke College,
Cambridge, arms



Pembroke arms

Hall, or Mary Valence Hall, it received benefits from Henry VI. Pembroke was the first Cambridge college to have a chapel of its own; the new chapel, by Wren, 1664, was enlarged by Sir Gilbert Scott in 1880-81. Ridley, Grindal, Whitgift, Andrewes, the younger Pitt, Sir Henry Maine, and the poets Spenser, Crashaw, and Gray were Pembroke men.

Pembroke College. One of the colleges of the university of Oxford. It was founded in 1624 by James I. The money was provided by Thomas Tesdale and Richard Wightwick, and an old hall, Broadgates, was reconstituted



Pembroke College, Oxford, arms a mark of esteem for the earl of Pembroke, then chancellor of the university. The buildings are in S. Aldate's, opposite Christ Church. The head is the master, and for long was also a canon residentiary of Gloucester. Preference is given in respect of certain scholarships to candidates from the Channel Islands. The most famous name in the college records is that of Johnson. Others are Sir Thomas Browne, Shennstone, Blackstone, and Whitefield.

Pembroke Dock. Dockyard of Pembrokeshire, Wales. It stands on the S. side of Milford Haven, 2 m. W. of Pembroke, of which borough it forms part, and is served by rly. In 1814 the government transferred here the dockyard from Milford. The dockyard, which covered 90 acres, was closed in 1925; reopened in the Second Great War as a repair base, it was closed again in 1946.

Pembrokeshire. S.W. maritime county of Wales. It has a splendid rugged and irregular coast, the indentations including St. Bride's Bay and Milford Haven, while herein are the bold headlands of St. David's Head, St. Ann's Head, and others. Its area is 614 sq. m. Off the coast are some small islands, Caldy being best known, and Skokholm and others famous for sea birds. The surface is undulating and scored with valleys, but there is a range of hills in the N. The Teifi, which divides it from Cardiganshire, the Nevers, and the two Cleddaus, E. and W., are the chief rivers. To the E. lies Carmarthenshire. Haverfordwest is the county town; Fishguard is a modern port and Newport an old one; Tenby a holiday resort. The chief industry

is rearing cattle. The county is in the diocese of St. David's and sends one member to parliament.

Called Dyfed, Pembrokeshire was ruled by the princes of Wales until some time after the Norman conquest. The Norman barons then built numerous castles here. In the 12th century Flemings settled; they left a mark on the cottage architecture and the fishing boats. Pembrokeshire was soon divided into a Welsh part in the N.W. and an English part in the S.E. The latter became known as little England beyond Wales. It was made a palatine earldom, remaining so until 1536. Outstanding castles are at Manorbier, Pembroke, Picton, and Carew. Pop. 87,206.

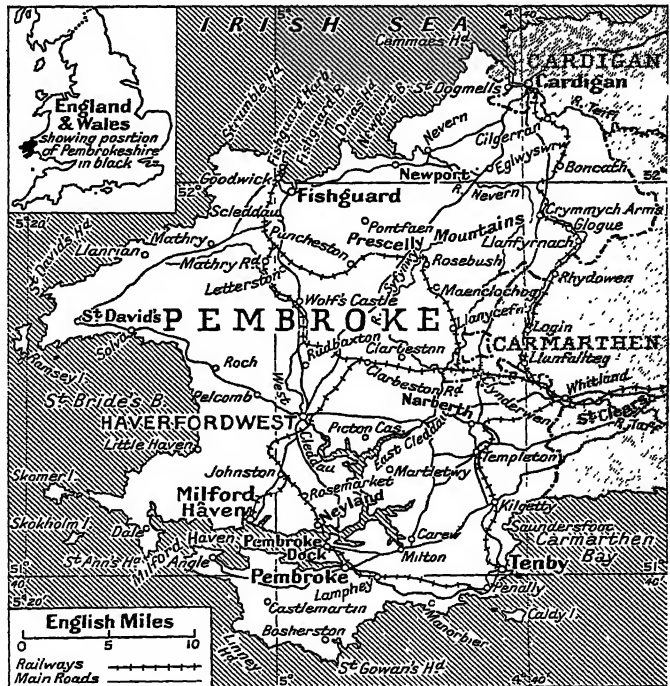
Pemmican. Preparation of food originally made by the American Indians with lean meat denuded of all fat, dried in the sun and wind, and pounded into a paste. When dry it will keep good for an indefinite period.

Pemphigus (Gr. *pemphix*, bubble). Group of diseases of the skin characterised by the formation of blisters or blebs. Acute malignant pemphigus is a disease met with in butchers and others who handle carcases; it is a bacterial infection. Chronic pemphigus is

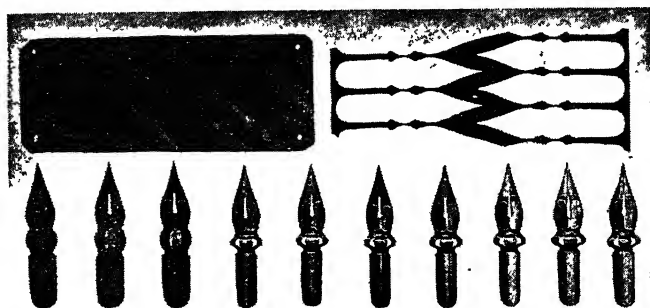
usually seen in elderly, debilitated persons; its cause is unknown. The eruption generally appears first on the lips or front of the chest. Large areas of the body may be affected. The disease is serious and may end fatally. *Dermatitis herpetiformis* is another form of pemphigus often associated with exposure, cold, and exhaustion. The condition gives rise to severe itching. Its essential cause is probably infection by a virus.

Pen. Instrument for writing with a fluid. The earliest writing instruments were the brushes of the Chinese and Egyptians, and the stylus of the Greeks and Romans. The origin of the quill for writing is uncertain, but it was for many centuries the chief writing instrument, holding its own till the middle of the 19th century. The constant necessary resharpening of quills led to attempts to make them durable by tipping them with various substances and imitating them in metal.

The first steel pen was made by Wise, of London, in 1803, but this was not a commercial success till Gillott, Mitchell, and Perry, between 1820 and 1830, began manufacturing an improved form by machinery. The pens are cut from steel sheets into blanks, the latter



Pembrokeshire. Map of the south-western county of Wales, containing Milford Haven, the finest natural harbour in the United Kingdom



Pen and pen-making. Processes in the manufacture of a steel pen. Top, left, rolled sheet of steel from which blanks are cut; right, scrap metal remaining after blanks are cut. Bottom, left to right: blank; pierced pen; marked or stamped with maker's name; raised or curved; after hardening; tempered; soured; ground; after point has been slit; coloured

By courtesy of Perry & Co., Ltd.

stamped or pressed into shape, hardened by plunging into hot oil, tempered, polished, and the point divided by a special shearing machine. In all some sixteen processes are required to make an ordinary steel pen or nib. Power presses allow several processes to be combined in one operation. Gold is used for the nibs of fountain pens, as it is more flexible, the points being made more durable by the addition of iridium. Special types of pens are used for ruling, duplicating, lithography, drawing, ticket writing, etc. See Fountain Pen; Ink; Writing.

Penal Code. Name given to a code of laws concerning crimes and offences and their punishments. The term includes the systematic arrangement of the laws, and most civilized nations have embodied their laws in some such code, the most famous of modern times being the Code Napoléon of France, which has served as a model for other European nations.

More specifically, the term is used for those penal laws of the 17th and 18th centuries which were passed against Roman Catholics in England and Ireland. Under these laws R.C.s were forbidden to acquire land by purchase, and those educated abroad in the R.C. faith were debarred from succeeding to real property, their estates passing to the next Protestant heir. The most severe penal laws were abolished in 1780, and most were done away with by various Acts in the 19th century. See Catholic Emancipation; Criminal Law; Toleration.

Penal Servitude. In English criminal law a form of imprisonment which superseded transportation, when the Penal Servitude Act was passed, 1853. Persons sentenced to penal servitude

were sent to convict settlements and not to local prisons. At first penal servitude was imposed only for sentences of under 14 years, persons sentenced for longer periods being transported, but by 1857 transportation had ceased in practice and penal servitude could be imposed instead of transportation for all sentences. When first introduced it involved three different punishments. The first part of the sentence (nine months) was served in solitary confinement, the second part on public works outside the prison at some harbour such as Portland or Chatham or in a convict settlement such as Dartmoor, and during the third part the convict, if of good behaviour, was released on ticket-of-leave under police supervision. The minimum sentence was 3 years (increased to 5 years in 1864 but reduced to 3 years again in 1891), and the maximum was for life. Changes made during the second half of the 19th century brought about a classification of prisoners and remission of up to a quarter of the sentence for good behaviour. Solitary confinement gradually disappeared in practice after a report of a committee under Herbert Gladstone in 1898; it was abolished only in 1922. The employment of convicts on work outside the prison became increasingly difficult, so that there was eventually little difference between penal servitude and ordinary imprisonment.

The Criminal Justice Act, 1948, abolished penal servitude and substituted simple imprisonment in every case.

Penance (Lat. *poenitentia*, repentance). Ecclesiastical term for the turning of a sinner from sin to repentance; for the acts that form the visible proof of repentance;

for the penitential discipline of the Church, and, in the R.C. communion, for the sacrament for the remission of sin committed after baptism, a remission effected by true supernatural sorrow, sincere confession, satisfaction, and priestly absolution. In the R.C. Church confession of mortal sin is held to be an absolute duty, and the sinner is bound to seek for absolution. This has been the case since the Lateran Council of 1215. Originally the expiatory part of penance involved heavy and lasting penalties. The wearing of sackcloth and ashes was once adopted as a sign of repentance; sometimes delinquents were required to make confession and express sorrow while standing in church clad in a white sheet. In process of time, however, the penalties came to be confined to prayers, fasting, and almsgiving. At one time it was possible for others than the person upon whom penance was imposed to do penance for him, if not altogether, at least in part. Rules, called Penitentials, were drawn up for the guidance of the confessor. See Absolution; Confession.

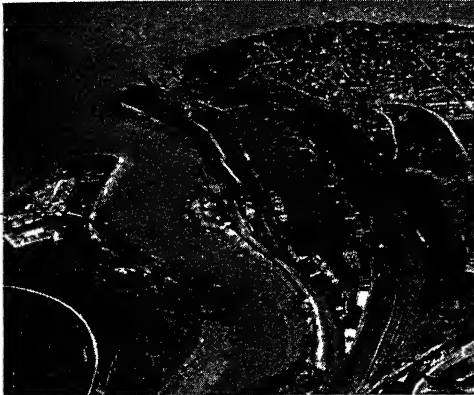
Penang. Settlement of the Federation of Malaya, until 1946 part of the Straits Settlements. From 1800 Penang included the district of Province Wellesley (*q.v.*) on the mainland and the Dindings to the S. Penang island lies about 2½ m. off the W. coast of the Malay peninsula, adjacent to Province Wellesley; measuring 15½ m. by 10½ m., it has an area of 110 sq. m. and a pop. (1941) of 247,460, of whom 166,974 were Chinese, 41,853 Malayan, 31,916 Indian, and 2,464 European. Penang island was bought from the native state of Kedah in 1785, and in 1826 was incorporated with Malacca and Singapore; the three became one crown colony 1867-1946. Penang's name was formerly Prince of Wales Island. It has good roads and a hill-railway; the chief town is Georgetown, with a fine harbour, a tin-smelting works, a racecourse, and golf-links.

Penang suffered heavily from air attacks in the Second Great War. A series of Japanese raids, Dec. 11-13, 1941, reduced the administration of the island to a state of chaos; European women and children were evacuated, and the native population panicked. On Dec. 19, following the loss of Kedah and Province Wellesley on the mainland, British troops were withdrawn from Penang. Although the tin-smelting works and power-station had been destroyed,

the Japanese used the radio station. See Malaya, Federation of.

Penang Lawyers (*Licuala acutifida*). Shrub of the family Palmae. It is a native of the island of Penang, Malaya. Its stems are about five ft. in length and about an inch thick. At the top there is a tuft of fan-shaped leaves, with prickly stalks. The name belongs properly to the stout walking-sticks into which the stems are converted after scraping and straightening.

Penarth. Urban dist., watering-place, and seaport of Glamorganshire, Wales. It stands on the



Penarth, Glamorganshire. Air view of the town and harbour

Ely, where it falls into Cardiff Bay, 4 m. S.E. of Cardiff and 166 m. W. of London. It has a rly. station. There are a pier, a fine esplanade, and several parks. Penarth was nothing but a small village before 1859, when work was begun on its tidal harbour. Pop. 16,720.

Peñas, GULF OF. Large opening of the Pacific, indenting the coast of Chilean Patagonia. It is 80 m. wide at its mouth and penetrates inland about 70 m., containing the islands of Xavier and Guaianeco.

Penates. Household gods of the ancient Romans. See Lares.

Pencil (Lat. *penicillum*, a little tail). Instrument for writing and drawing. The word is now chiefly used of the "black lead" or similar pencils, i.e. those pencils made of wood and containing a central core of lead, graphite, coloured chalk, slate, or other material. The modern black lead pencil contains no lead, the writing material being graphite and clay.

The earliest writing pencils were made with lead, graphite pencils being introduced into Great Britain in the 16th century. In the modern methods of manufacture, the graphite is reduced to a powder mixed with clay and water to the

consistency of dough, and forced through dies the diameter of the finished lead. The long graphite and clay sticks are dried, cut into pencil lengths, and then heated until all the moisture is thoroughly driven off. The greater the amount of clay in the mixture the harder the pencil. The hardness or softness is usually indicated by the letters H (hard) and B (black); the usual range is from 6B to 4H, and the commonest degree for everyday use is the medium known as H.B. The softer forms are preferred by artists, the harder by draughtsmen.

The graphite-clay sticks are then inserted into semi-circular or semi-hexagonal parallel grooves, cut in a slab of wood which is ultimately divided into a number of pencils. A similar grooved slab is laid on the first, glued firmly, the separate pencils cut apart, shaped, polished, varnished, etc. The whole process from beginning to end is carried out by machinery.

Coloured pencils are made of chalk, clay, etc., with colouring pigments added; copying-ink pencils are made of graphite with an aniline dye added; while slate pencils may be either unprotected rods of slate or wooden pencils with a slate core. There is also the metallic holder in which the "lead" is propelled and repelled by a screw, and refills can be supplied. See Graphite.

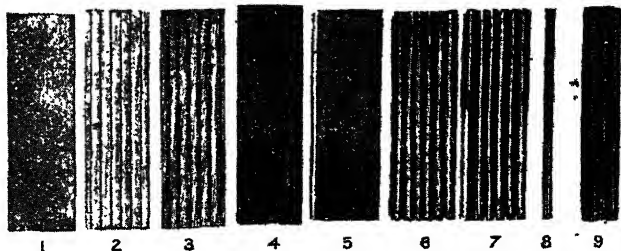
P.E.N. Club. International literary association, the letters of whose name stand for poets, playwrights, essayists, editors, and novelists. Founded in 1921 by

Mrs. C. A. Dawson Scott, it aims at international cooperation and friendship between men of letters. Centres were established in most world capitals, and by 1948 there were some 60. Congresses, held annually until the outbreak of the Second Great War, were resumed in 1946. Lectures, discussions, readings, and social gatherings are among the normal activities. The international presidency was held by Galsworthy, 1921-33; Wells, 1933-36; Jules Romains, 1936-39. Maurice Maeterlinck was elected in 1947. Presidents of the English centre have included J. B. Priestley, H. W. Nevinson, Storm Jameson, and Desmond MacCarthy.

Penda (c. 577-655). King of Mercia. He became king about 628, and soon defeated the West Saxons at Cirencester. A heathen warrior, in 633 he helped to defeat and kill Edwin, king of Northumbria, and in 642 he slew in battle another Northumbrian king, Oswald. In 654 this last champion of paganism slew Anna, king of the East Angles, and invaded Northumbria, but was defeated and slain, Nov. 15, 655. See Mercia.

Pendant. In architecture, a rigid hanging ornament, often elaborate, suspended from the summit of a Gothic vault, or from the bottom of a roof post or other constructional member below a ceiling. The term is also used for an ornament hung from the neck. See Gothic Architecture.

Pendennis. Novel by Thackeray published in 1850 with the full title, *The History of Pendennis, His Fortunes and Misfortunes, His Friends and His Greatest Enemy*. The author utilised experiences of his own early life in narrating the story of his hero, and sketched several of the characters from actual people, e.g. the clever, shiftless Captain Shandon, who was based on W. Maginn (q.v.).



Pencil. Successive stages in the making of a lead pencil. 1. Rough wood. 2. Wood when grooved. 3. Grooved wood with lead in position. 4. Block of wood made up of 2 and 3 placed together, enclosing lead in grooves. 5. Ends of block levelled. 6 and 7. Stages in moulding the block into pencils. 8. Pencil painted and polished. 9. Finished bundle

Penderel. The name of an English royalist family. The five sons of William Penderel—a yeoman of Boscobel, Salop—Richard, Humphrey, John, William, and George, helped Charles II after the battle of Worcester, 1651, to disguise himself and hide in an oak and also in their houses for a week, Sept. 3-9. At the Restoration they were highly honoured and granted pensions.

Pendine Sands. Stretch of sand between Saundersfoot and Pendine along Carmarthen Bay, Carmarthenshire, Wales. It was used for speed trials by racing motorists during the 1920s, and Parry Thomas was killed while racing here in 1927.

Pendlebury. District of Lancashire, England, part of the bor. of Swinton (*q.v.*).

Pendle Hill. A landmark of Lancashire, England. The hill is 1,831 ft. high, and stands some 1,500 ft. above the surrounding country near the Yorkshire border. The hill extends in a ridge from N.E. to S.W. with its steeper side towards the valley of the Ribble, and is usually ascended from Clitheroe. It gives its name to the Pendleside Series in geology. The Lancashire Witches of 1612 were reputed to hold their grand council at Malkin Tower on the hill.

Pendleside Series. In geology, the name given to a series of rocks between the upper division of the Carboniferous limestones and the millstone grits. The series consists chiefly of black limestones and shales. It is so called from its development at Pendle Hill, Lancs.

Pendulum. Rigid body free to swing on a horizontal axis under the influence of gravity. A simple pendulum is the name theoretically given to a pendulum which consists of a particle of matter suspended from a point by a weightless string. The time taken for such a simple pendulum to make one complete beat is $2\pi\sqrt{l/g}$ where l is the length of the string, and g is the acceleration due to gravity. This law applies only for small oscillations, and for such the period of beating is constant at any particular place. Since, however, it varies with g , the same pendulum taken to different parts of the earth, or to different altitudes, serves as a means of calculating the force due to gravity.

Pendulums of the same length, swinging through small arcs, have the same period, the period not being dependent upon the amplitude of the arc. The period is directly proportional to the square

root of the length: thus a pendulum of a length to beat seconds (the so-called "seconds pendulum") is four times as long as one to beat half-seconds. Only when the pendulum is hung by a flexible filament, or connected to its support at the top by a similarly flexible material, is it isochronous, i.e. absolutely regular in tempo of beat. The flexible connexion allows the pendulum virtually to shorten as it swings in a longer arc (but still within strict limits), thus counteracting any small increase in the arc. The curve traced out by the pendulum is a cycloid one.

Any solid object suspended from a horizontal axis performs oscillations similar to those of a simple pendulum, and in dynamics is called a compound pendulum. A compensation pendulum is one which is compensated against changes of temperature. The various methods used include employing together metals which have differing coefficients of expansion; in place of these "compensated pendulums," it is now usual to employ a metal little affected by change in temperature.

Besides its use in clocks and for obtaining the value of g , the pen-

ure the velocities of shot or bullets. The bob of the pendulum is replaced by a wooden block into which the shot or bullet is fired. The distance through which the block moves and the consequent time of oscillation of the pendulum enables the velocity of the projectile to be calculated. See Atwood's Machine; Ballistics; Clock; Foucault.

Penelopë. In Greek legend, wife of Odysseus (*q.v.*). The long absence of her husband caused a number of suitors for her hand to come to the royal palace at Ithaca, where, in spite of her refusals, they lived riotously. She promised to make up her mind as soon as she had finished a garment, of which she secretly unwove each night as much as she had woven in the day. *Pron.* Pe-nellopy.



Penelope. From a Greek sculpture in the Vatican

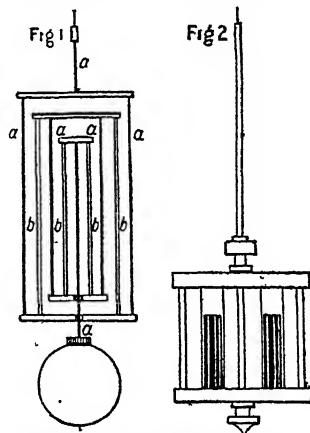
Peneplain (Lat. *pene*, almost). Ex-

tensive area which has been worn down by erosion to a nearly level surface, across which sluggish rivers flow along meandering courses. Elevation of a peneplain by earth movements will cause rejuvenation of the rivers, which will excavate valleys in the original surface. This latter can then be traced in the accordant summit level of flat-topped hills and ridges. Many such ancient peneplains can be recognized in Wales, Africa, etc., and three can be identified in the Appalachian Mts. of eastern U.S.A.

Penetanguishene or **PENETANG.** Town of Ontario, Canada. It is on the C.N.R., on an inlet of Georgian Bay, 92 m. N. of Toronto. Gateway to the islands of Georgian Bay, it is a popular summer resort. During the war with the U.S.A. the town was fortified as a Canadian naval station. A regiment of French scouts, the bulk of the garrison, was rewarded with a grant of land and exemption from taxation, a privilege still enjoyed by their descendants. Pop. 4,521.

Peneus. Ancient name for the river of Greece now known as the Salambria (*q.v.*) or Salamvria.

Penge. Urban dist. of Kent, England. Adjoining Sydenham on the Surrey border, it is 6 m. S. of London and connected with it by rly. and bus. Formerly a detached hamlet of Battersea, and until about 1830 merely a common, Penge was in part absorbed for the

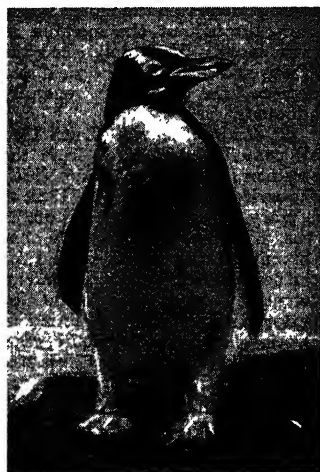


Pendulum. Compensation is provided (Fig. 1) by the differing coefficients of expansion of metals a and b , or (Fig. 2) by expansion of mercury columns

dulum has been used in the famous experiment of Foucault to show the rotation of the earth. A ballistic pendulum is one used to meas-

Crystal Palace and in part given over to the builder. The Watermen's and Lightermen's Asylum dates from 1839 and has a museum of marine curiosities. The Empire Theatre is well known for repertory. The Penge Case was a *cause célèbre* in 1877, when there appeared at the Old Bailey, on a charge of murder, Louis and Patrick Staunton, the latter's wife, Elizabeth Ann, and her sister, Alice Rhodes. The victim was Harriet Staunton, wife of Louis, a woman of weak intellect, with a fortune of £3,000. All four prisoners were convicted and sentenced to death. Alice Rhodes was pardoned, the sentences on the other three being commuted to penal servitude for life. The case is famous for the defence by Sir Edward Clarke (*q.v.*), described in his Autobiography. Penge was heavily bombed in Sept.-Nov., 1940, and by flying bombs in the summer of 1944. Pop. 27,762.

Penguin. Name given to the flightless sea-birds of the order Sphenisciformes. They are sea-



Penguin. Yellow-crowned species, found in the Southern Pacific and Antarctic Oceans

birds with boat-shaped bodies, legs placed very far back, the toes webbed, and the wings useless for flight. The latter are entirely without quills and the feathers covering them are small and scale-like. They are incapable of flexure, but are worked from the shoulder with a somewhat rotatory action as efficient paddles. The feathers of the body form a thick, close coat, but these also approach to scales in character. The birds stand perfectly erect, and with their great paddles held loosely at their sides present a grotesque appearance

when they assemble in thousands at their breeding places. Macaroni penguins (*Eudyptes*) have long, curling crests on their heads. A "jackass" or braying penguin is found at the Cape of Good Hope. The bird's range extends from the equator to the Antarctic.

Penguin Books. Popular series of pocket-sized paper-backed reprints and original works, the first series of their kind to appear in Great Britain. The first batch of ten volumes was issued July, 1935, and the price of 6d. was retained in all subsequent books until the Second Great War. The Pelican books, in the same format, but devoted to educational, philo-

sophical, and technical works, were first issued May, 1937. The publishers are Penguin Books Ltd., founded by Allen Lane, and the enterprise was further developed in the Puffin books (for children), an edition of Shakespeare, guide-books, and periodicals such as Penguin New Writing, Penguin Film Review, Penguin Music Magazine.

Penguin Island. English translation of *L'Île des Pingouins*, title of the satirical survey of modern French history published by Anatole France (*q.v.*) in 1908. Told in a series of fables, the book recalls the finesse of Voltaire without his cruelty or viciousness.

PENICILLIN AND OTHER ANTIBIOTICS

Sir Alexander Fleming, F.R.S., Prof. of Bacteriology, S. Mary's Hosp., London

An account of the discovery, nature, and use of penicillin by the scientist who first described it, and who shared the Nobel prize for medicine in 1945 for his part in the discovery of this drug

The idea that one microbe can interfere with the growth of another is not new. Bacterial antagonism was first demonstrated by Pasteur and Joubert in 1877 when they showed that if their culture medium was contaminated by certain bacilli, the bacillus of anthrax would not grow. In the next few years a very considerable literature appeared on antagonism and a new word *antibiosis* was coined by Vieullemin to denote inhibition or destruction of one microbe by the action of products formed by another. The organism which produced the active substance was called the *antibiot*. The word *antibiotic* has since frequently appeared, but it is only since the success of penicillin that it has come into common use to denote substances made by living organisms in their growth which have a powerful inhibitory or lethal effect on micro-organisms.

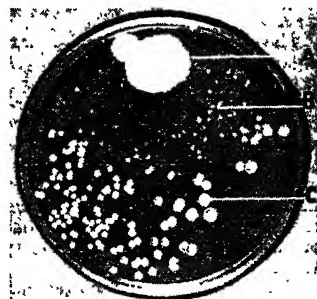
Antibiotics have been used at intervals for over 50 years in the treatment of infections. Of the earlier antibiotics the most notable was Pyocyanase, an antibacterial substance produced by the microbe of blue pus, *Bacillus pyocyanus* (now known as *Pseudomonas aeruginosa*). In 1898 this was found to destroy a large number of microbes, and especially the diphtheria bacillus. It was recommended for application to infected areas and for a time had a considerable vogue. The results, however, were not very dramatic, and it disappeared from medical practice.

More and more instances of bacterial antagonism were described and the literature on the

subject grew; but as time went on it became more academic. All bacteriologists were familiar with these antagonisms and in his routine cultures a clinical bacteriologist could notice instances of bacterial antagonism every week. This familiarity with antagonism did not help the discovery of penicillin—it rather hindered it, for the fact that one microbe inhibited another was so common that the matter seemed hardly worth pursuing.

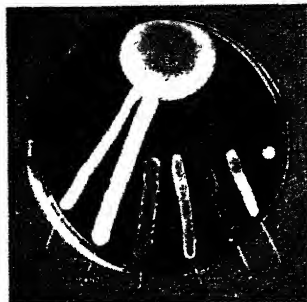
In 1928 a culture plate of staphylococcus prepared by the writer became contaminated with a colony of a mould. Around this mould the colonies of staphylococci appeared to be undergoing dissolution (Fig. 1).

This so excited the writer's curiosity that he obtained the mould in pure culture and investigated its action on different



Penicillin. Fig. 1. Culture-plate showing the dissolution of staphylococcal colonies in the neighbourhood of a penicillium colony. A, Penicillium colony. B, Staphylococci undergoing lysis. C, Normal staphylococcal colony

bacteria. Some of the mould spores were planted on one side of a culture plate, and after it had de-



Penicillin. Fig. 2. Various bacteria streaked radially to a four-day-old colony of *P. notatum* on agar. The bacteria are: 1, *Staphylococcus*; 2, *Haemolytic streptococcus*; 3, *E. diptheriae*; 4, *B. anthracis*; 5, *B. typhosus*; 6, *B. coli*.

veloped for a few days various bacteria were inoculated in streaks radially to the mould colony. Some of these were found to grow right up to the mould colony while others were completely inhibited for an inch or more (Fig. 2).

Then the mould was grown on a fluid medium. Here it grew as a felted mass on the surface, with a clear fluid underneath. This fluid was embedded in a "gutter" cut from a culture plate and bacteria were streaked perpendicularly to the gutter. Some of them grew right up to the gutter, but with others the growth stopped an inch or more away (Fig. 3).

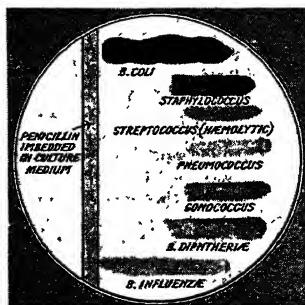
These two experiments showed that this mould produced in its growth a substance which had no effect on the growth of some microbes, but, was strongly inhibitory on many others; and it was of great interest that among the microbes which were most strongly affected were many of those which most commonly infect man.

The mould, on examination, was found to be a penicillium and eventually it was found to be *Penicillium notatum*, a species described by Westling and allied to *P. chrysogenum*. It was for the reason that this antibacterial substance was produced by a penicillium that it was named penicillin. Other moulds were examined but none of them produced this active substance.

Further experiments showed that penicillin actually killed certain bacteria; and the very first observation was one of dissolution of the bacteria. Penicillin is thus bacteriostatic, bactericidal, and bacteriolytic.

It had been found that all the antiseptics in common use were more toxic to the white cells of the blood (leucocytes) than they were to bacteria. Penicillin, while it was very active against some bacteria, had no injurious effect on leucocytes. In this it was unique, and it was this property which suggested its possibilities as a therapeutic agent. But penicillin was an unstable substance. Its activity disappeared in a few days or weeks, according to the conditions in which it was kept, and it was not known how it could be sterilised.

In 1932 Clutterbuck, Lovell, and Raistrick showed that this same strain of mould would produce penicillin in a simple medium consisting of a few salts and some glucose. They also showed that it could be extracted in acid ether; but circumstances prevented them from pursuing the work to the stage of producing an effective concentrated penicillin. It was only in 1940 that Florey and Chain and their collaborators in Oxford,



Penicillin. Fig. 3. Various bacteria streaked perpendicularly to penicillin "gutter".

using the same mould, succeeded in concentrating penicillin something like 1,000 times and stabilising the concentrate by drying. This penicillin concentrate was tested on experimental infections in mice, and it was found that extremely small doses (much smaller than any of the sulphonamides) would cure infections of streptococcus and staphylococcus, and that penicillin had no poisonous action on the animal. Then in the next year, after enormous labours, the Oxford workers prepared enough concentrated penicillin to treat some patients suffering from serious septic infection. The results were dramatic—so dramatic that there was no doubt that penicillin was the most powerful chemotherapeutic agent against the common septic infections.

The problem now was to prepare penicillin in quantity and, as the

Second Great War was seriously hampering possible large-scale production in the U.K., Florey took all his information to the U.S.A. and succeeded in interesting the authorities there. Valuable research work was done at the north-western regional laboratory in Peoria by Coghill and others, and soon the large pharmaceutical houses in the U.S.A. established production plants.

Advances were made in several directions:

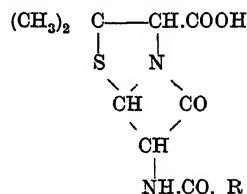
(1) *In culture medium.* It was found that the addition of "corn steep liquor" to the simple medium used by Raistrick and the Oxford workers gave a greatly increased yield of penicillin. Other improvements were later made, such as the addition of substances which would otherwise have to be synthesised by the mould in its growth.

(2) *Method of culture.* At first all penicillin was prepared by growing the mould on the surface of a shallow layer of fluid in some kind of flat bottle. It was found later that if the fluid was properly agitated and aerated the mould would grow throughout the medium in large tanks. This diminished the labour and increased the yield and became the method generally adopted.

(3) *Strain of mould.* Until 1944 all penicillin was made from the strain of *Penicillium notatum* which the writer had isolated in 1928 at S. Mary's Hospital, Paddington. It was, however, inconceivable that this unselected strain should be the best penicillin producer, and an intensive search was made for better strains. One was found in Peoria which, in deep culture, gave a much better yield. A still better natural mutant of this strain was selected, and this was treated with X-rays and ultra-violet light with the result that still better strains were evolved.



The result of all these improvements was that the crude culture fluid before purification contained in 1948 about 100 times as much penicillin as it did in 1941.

CHEMISTRY OF PENICILLIN. The formula is as follows:



The mould can make at least four different penicillins, known in the

U.K. as 1, 2, 3, and K, in the U.S.A. as F, G, X, and K. These differ only as regards a radicle (R in the formula). The radicles in these four penicillins are:

British names	U.S. names	Radicle
1	F	$\text{CH}_3 \text{ CH}_2 \text{ CH}-\text{CHOH}_2$
2	G	
3	X	$\text{OH} \text{ } \text{CH}_2$ 
K	K	$\text{CH}_3 \text{ CH}_2 \text{ CH}_2 \text{ CH}_2 \text{ CH}_2 \text{ CH}_2 \text{ CH}_2$

These penicillins differ somewhat in their antibacterial power, and K is much less effective than the others in the treatment of disease. It should not appear in large proportion in any commercial penicillin.

The formula shows an unusual β lactam ring and when penicillin is acted on by strong chemicals or by some metals or by penicillinase this ring is broken and the antibacterial power is lost. Penicillinase is a substance made by many bacteria, and its presence in an infected area may be of considerable importance in practical medicine.

Penicillin is an acid which readily forms salts and the sodium, calcium, and potassium salts are in common use.

UNIT OF PENICILLIN. The Oxford workers established a unit which became known as the Oxford unit. This has been accepted as an international unit and corresponds to 0.0006 mg. of pure penicillin 2 (G). One million units is, therefore, equal to 0.6 gr. of this substance.

PROPERTIES OF PENICILLIN. It is issued as a dry powder and in this state is relatively stable. When, however, water is added it becomes unstable, and even in a refrigerator it will not maintain its activity for long. As was shown by the early experiments, it has a selective action, affecting some bacteria only. While penicillin treatment can be extraordinarily effective if the infecting bacterium is sensitive, it is quite without effect on an infection with an insensitive microbe.

RESISTANT STRAINS OF BACTERIA. Even when nearly all strains of a microbe such as staphylococcus are very sensitive, there are a few naturally resistant strains. Widespread penicillin treatment destroys many of the sensitive strains, the resistant ones are unaffected, so the percentage of the latter has increased. Bacteria can also be made resistant by exposure

to sublethal concentrations of penicillin. It has been shown, however, that by association with other microbes, some at least of the resistant strains rapidly regain their sensitivity.

CLINICAL USES. Penicillin has been used successfully for the treatment of all infections due to penicillin-sensitive microbes. These include, among others, the common septic infections, pneumonia, meningitis, venereal disease, endocarditis, actinomycosis, and anthrax. In some infections such as gonorrhoea the infection is eradicated in a few hours; in others, such as syphilis, endocarditis, or actinomycosis, some weeks of constant treatment may be necessary.

OTHER ANTIBIOTICS. In 1939, before penicillin was popularised, Dubos described tyrothricin, an antibiotic derived from the *Bacillus brevis*. This had a powerful action on Gram-positive microbes but little action on the Gram-negatives. Unfortunately it was too toxic for internal administration, but it has been extensively used as a local application in septic infections. It is stable in solution.

The remarkable success of penicillin in treatment led to an intensive search for other antibiotics. Large numbers have been found. These are produced by flowering plants, fungi, moulds, actinomycetes, bacteria, and protozoa. Very few have practical value.

Gramicidin S, produced in Russia by a bacillus, is akin to tyrothricin and is used for the same purposes. Many other antibiotics have been derived from spore-bearing aerobic bacilli but none of them has been sufficiently developed to come into extensive use. One of them, "Aerosporin," has been recommended for the treatment of whooping cough.

Apart from penicillin, the only antibiotic in common use for systemic treatment is streptomycin. This is produced by an actinomycete (*streptomyces griseus*). It is a basic substance forming salts with acids. It affects a wider range of organisms than does penicillin and the tubercle bacillus in particular is sensitive to its action. It is of value for the more acute forms of tubercular infection, such as meningitis and miliary tuberculosis, but even with streptomycin treatment, the benefit in most cases is only temporary. It differs from penicillin also in having some

toxic action on the human body, especially on vestibular function, so that doses have to be carefully controlled. Something better is necessary before the scourge of tubercular infection is brought under control. Consult The Story of Penicillin, G. Lacken, 1945; Penicillin: its Practical Application, Sir A. Fleming, 1946.

Penicillin Act. An Act of parliament passed in 1947. It prohibits the sale or supply of penicillin by any one except certain qualified persons—e.g. a doctor or a dentist.

Penicillium (Lat. *penicillus*, pencil). Genus of fungi, including some of the common moulds which destroy foodstuffs and organic substances of many kinds. Several species are used in brewing and in making stilton and gorgonzola etc., cheeses. The most useful is perhaps *Penicillium notatum*, from which is obtained penicillin (q.v.).

Penicuik. Police burgh of Midlothian, Scotland. It stands on the N. Esk river, 10 m. S. of Edinburgh, with a rly. station. The buildings include the tower of the old church of S. Kentigern. Penicuik House, of the 18th century contains objects of historic interest. The name means cuckoo's hill. Pop. 5,000.

Penillion. Ancient form of singing peculiar to Wales. To the music of a harp playing a series of traditional airs the singer (or singers in turn) improvised songs in counterpoint, not necessarily in the same metre, changing the counterpoint as often as the harpist changed the air. In modern penillion singing the counterpoint is usually rehearsed, and often sung by a chorus in unison. *Proem* (approx.) pen-ith-leon.

Penington, Sir Isaac (c. 1587-1661). Lord mayor of London. Son of a wealthy merchant, he turned



Sir Isaac Penington, Lord Mayor of London

his attention to politics, zealously espousing the Puritan cause. He was elected M.P. for the City in 1640, and quickly became prominent by uncompromising speeches. As lord mayor for 1642, he raised immense loans in the City for his party, was one of the bitterest opponents of Laud, and sat as a commissioner at the trial of the king, but would not sign the death warrant. In the same year, 1649, he was a member of the council of

state. At the Restoration, Penington was brought to trial and condemned to death, but the sentence was commuted to imprisonment, and he died in the Tower, Dec. 17, 1661. His eldest son, Isaac Penington (1616-79), became a leader of the Society of Friends.

Peninsula (Lat. *pene*, almost; *insula*, island). Projecting piece of land almost surrounded by water. Peninsulas are commonly formed by the submergence of mountainous regions, especially if the mountains of the sunken land mass are arranged in long chains, e.g. the Italian, Balkan, and Malay peninsulas. Most peninsulas point S., but exceptions pointing N. are Yucatan, Mexico; Jutland; Taimyr, Siberia; and Cape York.

Peninsular and Oriental Steam Navigation Company. British steamship line, usually



P. & O. Co. Flag.
Top, white; bottom, yellow;
left, blue; right, red

called the P. and O. The original Peninsular company was founded in 1834, to trade with the Iberian peninsula. The house flag incorporated the old Portuguese royalist and Spanish colours. In 1840 the co. was incorporated under its present title. From its incorporation the company has held the British government mail contracts to Egypt, India, and later the Far East, and in 1852 was given that to Australia. In 1851 the first screw steamer was run, and the line has always kept abreast of modern developments, though the passage through the Suez Canal has limited the size of vessels to 25,000 tons. In 1910 the Blue Anchor line was purchased, and the group controls nearly 2,000,000 tons of shipping. P. and O. ships acted as troopers and transports in many wars. The head offices are at 122, Leadenhall Street, London, E.C.3.

Peninsular War. Struggle carried on by Great Britain as the ally of Spain and Portugal against France, 1808-14. This name was given because it was waged in the Iberian peninsula. The Spanish people, over whom Napoleon had placed his brother Joseph, rose in revolt and secured the surrender of a French force at Baylen in July, 1808. The Portuguese had joined the movement, and the directors of British policy, having realized the possibility of striking at France through Spain, sent out Sir A.

Wellesley (later duke of Wellington). He landed in Portugal with a force of 12,000 men, routed a small army at Roliça, and won a battle at Vimeiro. But Sir Hew Dalrymple, in supreme command, restrained an advance, and signed with Junot the convention of Cintra, by which the French undertook to evacuate Portugal. One reason for Dalrymple's delay was the knowledge that Sir John Moore was on the way to the seat of war with 10,000 men.

The war continued, however, and Napoleon himself came to Spain. Moore, now in command, invaded that country, with the intention of cutting the French communications. Orders were given him to join with a force under Sir David Baird, and large armies of Spaniards being in the field, successes were hoped for. But Napoleon routed the Spanish forces with great rapidity and ease, and advancing towards the British he quickly changed the situation. Having joined Baird and fought a cavalry action at Sahagun, Moore decided to retreat, and followed by the enemy, under Soult, he made his memorable march to Corunna. There, Jan. 16, 1809, he turned and defeated Soult. Moore was killed, but his army was embarked.

The next stage began with the return of Wellesley, who in April landed at Lisbon, fought his way across the Douro, and on July 27 won the battle of Talavera. Failing to secure the effective cooperation of the Spaniards, who had lost heavily in a series of battles in their own country, or to secure reinforcements from home, he abandoned Spain, and during the winter constructed the defensive lines of Torres Vedras to cover Lisbon. Drawing the enemy after him, he fell back thereto, fighting on Sept. 27, 1810, the battle of Busaco, after which the French captured the frontier fortresses of Badajoz and Ciudad Rodrigo.

Wellington early in 1811 returned to the offensive. He detailed a force to attack Badajoz, and in May won the battle of Fuentes d'Onoro and captured Almeida. Albuera quickly followed, but throughout the year Badajoz and Ciudad Rodrigo defied all his efforts. In 1812, however, both were stormed, and Wellington entered Spain. On July 22 he won the great battle of Salamanca and occupied Madrid, which was captured, after a first attempt had failed, in Aug.; but an advance of the French armies forced him to fall back to the frontier of

Portugal. Following another pause, which he used to reorganize the armies of his Spanish and Portuguese allies, he was successful on June 21, 1813, at Vittoria. As a result of the greatest battle of the war, the French were driven into their own country. The last stage was the passage of the Pyrenees and the advance into France. There several battles were fought, notably for the possession of San Sebastian. Then in Oct. Wellington crossed the Bidassoa and secured the fortress of Pampeluna. A strong French position on the Nivelle was the next objective, and it was only after some hard fighting in Dec. that this river was passed. Some desperate fighting for the possession of Bayonne followed. This included the battles of the Nive, four days of combat in Dec., the passage of the Adour, and the battle of Orthez in the following Feb.

The retreating French next stood before Toulouse, which was entered after another victory in April, when the abdication of Napoleon ended the war.

The British losses were put down as 36,000. The French lost heavily, too, while this "running sore," as Napoleon called it, was one of the chief causes of his overthrow. See Albuera; Badajoz; Ciudad Rodrigo; Wellington, etc. *Consult* History of the War in the Peninsula and S. of France, Sir W. Napier, new ed. 1886; History of the Peninsular War, C. Oman, 1902-11.

Penis (Lat. *pendere*, to hang). Male organ of micturition and copulation. It consists of two long, narrow bodies: the *corpora cavernosa* is a network of erectile tissue, below which is the *corpus spongiosum* enclosing the urethra or tube from the bladder. The end of the *corpus spongiosum* is called the glans or head and is covered by the prepuce or foreskin, except when the latter has been removed by circumcision. The opening in the glans is termed the meatus. In some animals, notably dogs and all felines, the anterior half of the penis contains a penial bone.

Peñíscola. Town of Spain, in the prov. of Castellón de la Plana. It stands on the Mediterranean, 5 m. by road S. of Benicarló and 80 m. N.N.E. of Valencia. Built on a rocky islet connected with the mainland by a narrow isthmus, it is called the Gibraltar of Valencia. Originally a Moorish fortress, it was captured by James I of Aragon in 1233.

Penistone. Market town of the W. Riding of Yorkshire, England. It stands on the Don, 12 m. from Sheffield by rly. The church of S. John the Baptist is an old building, and there is a grammar school, founded in 1392. The industries include steel works, sawmills, and vinegar brewing. Stone and coal are worked in the neighbourhood. It gives its name to a division returning one member to parliament. Market days, Mon. and Thurs. Pop. 5,977.

Penitentiary. Word used in several senses. Commonly it is synonymous with prison. In the R.C. Church a penitentiary is a priest attached to cathedral churches, whose duty is to deal with the punishment passed on penitents for grave sins. The word is also used for the central office in Rome dealing with such questions, presided over by the grand penitentiary. See Prison.

Penjdeh OR PANJDEH. Village of Turkmen S.S.R. It stands near the union of the rivers Kushk and Murghab. Here, in March, 1885, an incident occurred which nearly led to war between Great Britain and Russia. The boundary line between Afghanistan and Russian Turkistan was being marked out, when an Afghan force, having refused to withdraw, was attacked by the Russians and driven away. Great Britain looked at the matter as the protector of Afghan interests, but the excitement soon died away.

Penkridge. Town of Staffordshire, England. In the rural dist. of Cannock, it stands on the little river Penk, W. of Cannock Chase, 6 m. S. of Stafford. Served by rly., it has an agricultural trade, while stone is quarried in the neighbourhood. The church of S. Michael and All Angels was once a collegiate church. Pop. 2,550.

Penmaenmawr. Urban dist. and watering place of Carnarvonshire, Wales. It is about 4 m. W.S.W. of Conway, and has a rly. station. It is visited for the beautiful scenery around. Penmaenmawr Mt., 1,550 ft. high, is the N. extremity of the Snowdon range. On it stood, until demolished in 1920, the remains of a large British fort. Pop. 4,000.

Penn. Village of Buckinghamshire, England. A picturesque place in typical Chiltern country, it has given its name to the district associated with William Penn (*q.v.*), the Quaker founder of Pennsylvania. It is about 2½ m. N.E. of High Wycombe, and a place of pilgrimage for American

visitors. The parish church contains several monuments to the Penn and Curzon families. At Jordans, at Chalfont St. Giles, famous for its Quaker meeting-house, is the grave of Penn.

Penn, SIR WILLIAM (1621-70). English sailor. He was born probably at Bristol, and held his first command in the navy in 1644, on the parliamentary side. In 1651-53 he was engaged in the pursuit of Prince Rupert, and in the 1st Dutch War rendered distinguished service as second in command to Blake. In 1654 Penn was sent to the West Indies on an expedition which failed in its first objective, the capture of San Domingo, but took Jamaica. On his return Penn was committed to the Tower for reasons which remain obscure, but was shortly released. He accompanied Montagu, afterwards 1st earl of Sandwich, in the Naseby to bring Charles II back to England at the Restoration, being knighted by the king as he came on board. Appointed a commissioner of the navy, he served under the duke of York, and died Sept. 16, 1670.

Penn, WILLIAM (1644-1718). English Quaker, founder of Pennsylvania. The son of Sir William Penn (*v.s.*), he was born in London, Oct. 14, 1644, and while studying at Christ Church, Oxford, became converted to Quakerism, and was expelled in 1661. He spent some years in France, Italy, and Ireland, and even engaged in military duties, but by 1668 had become once more closely identified with Quaker life and doctrine, and was imprisoned, 1668-69, for publishing an unlicensed tract, and again in 1670-71 for infringing the Conventicle Act.

He inherited a considerable fortune from his father, preached the Quaker message in England, Holland, and Germany, and was able to use his social influence on behalf of his persecuted co-religionists. In 1676 he took a leading part in the foundation of a Quaker colony in West New Jersey, and followed this up five years later by securing from the duke of York a grant of the territory which was to form the state of Pennsylvania (*q.v.*), and as governor drew up its memorable constitution, establishing freedom of worship within its boundaries. In 1682 he crossed to America to take possession of his territory, fixed on the site for its capital, to be named Philadelphia (*q.v.*), and at Shakumaxon made his famous treaty of friendship with the local Indians.

Penn remained in Pennsylvania until 1684, and again from 1699 to 1701, but his later life was passed in supporting the efforts of the Friends in England. He was intimate



After B. West

with James II, and was thus again able to use his influence to secure the release of the imprisoned Quakers and a measure of tolerance. His alliance with James, unbroken by the revolution of 1688, led to his arrest in 1690, and from 1692 to 1694 he was deprived of his colonial powers. His later years were clouded by ill-health and money troubles, caused by his expenditure on his religious work and by an untrustworthy agent at home. Penn died at Ruscombe on May 30, 1718, and was buried at Jordans, Bucks.

He was a man of solid and upstanding character, deeply religious, and with a fine clarity of style. Although he lacked in judgement in some respects, the accusations of double-dealing made against him have only weak foundations. See Society of Friends. Consult Quaker and Courtier, Mrs. C. Grant, 1908.

Pennant OR PENNON (Lat. *penna*, plume). Term applied to a long flag narrowing to a point,



Pennant, flown at masthead

sometimes forking at the end. In this sense, a pennant was formerly borne on a lance by a knight bachelor, sometimes with his armorial bearings upon it. It was used in British lancer regiments. Section leaders' cars in armoured squadrons carry a pennant. In the nautical sense the pennant, or pendant, is a long streamer-like flag flown at the mast of a vessel in commission, and lowered when the vessel goes out of commission. A broad pennant, short and forked, is flown to show the ship of the commodore of a squadron. Pennants are worn on British airliners carrying mail. See Flag.

Pennant, THOMAS (1726-98). British naturalist. Born at Downing, Flintshire, June 14, 1726, he was educated at Wrexham and at Queen's College, Oxford, but took no degree. His British Zoology was started in 1761, the first part

appearing in 1766. This work was followed by his *History of Quadrupeds*, 1781, which established



Thomas Pennant,
British naturalist

his reputation as a naturalist. Many of Gilbert White's letters in the *Natural History of Selborne* are addressed to him. He died Dec. 16, 1798. His best known works are *Tours in Scotland*, 1771-90; *Tours in Wales*, 1778, ed., with memoir by Rhys, 1883; *Account of London*, 1790; *Outlines of the Globe*, 1798-1800. Consult his *Literary Life*, 1793.

Pennatula OR SEA PEN. Genus of horny corals (Alcyonarian Anthozoa) which present an appearance similar to a quill-pen, i.e. to the wing-feather of a large bird. It is really a colony of polyps. There is a central stalk of horny lime, of which the lower part may be buried in the sea-bed, while from the upper portion branches spread out on each side and are fringed with polyps. Some of the species are luminous, as the small British *Pennatula phosphorea*, of a dull purple colour and only a few inches long. It is found in warmer seas up to a foot in length.

Pennell, JOSEPH (1860-1926). American etcher, lithographer, and author. Born at Philadelphia, July 4, 1860, he studied at the local academy and school of industrial art. He spent much time in Great Britain, and was the author, with his wife, Elizabeth Robins, of the standard life of the artist Whistler, and besides being represented in galleries all over the world, was a prime authority on lithography. Great industrial undertakings, e.g. the Panama Canal, and British munition works during the First Great War, furnished many subjects for his art. He died April 23, 1926. His wife wrote a *Life of Pennell* (2 vols.), 1930.

Pennine Alps. Division of the Alps on the borders of Switzerland and Italy. They lie between the Bernese Alps on the N. and the Graian Alps on the S.W., with the Lepontine Alps on the E., dividing the Rhône and Dora Baltea valleys. They include some of the loftiest summits in Europe, such as the Great St. Bernard, Grand Combin, Dent Blanche, Matterhorn, and Monte Rosa.

Pennine Chain. Mountainous region of N. England. It forms the

S. portion of the Central Uplands of Britain, and extends S. from the Scottish border as far as the great curve of the Trent; the S. portion is the Peak. Its continuity is broken by the Tyne and Aire Gaps, which facilitate communication between E. and W. On the N.W. it is continuous with the Cumbrian upland, the lowest point being the Shap saddle between Edendale and the flats round Morecambe Bay. Geologically, it is an uplift of carboniferous rock which has been denuded down to the lower members of the series, the millstone grit and mountain limestone, and is in the main a rugged, bare moorland with many peat bogs; the coal measures have disappeared from the heights,



Pennatula. Polyps of Pennatula phosphorea, greatly magnified
F. Martin Duncan

but occur in great extent on both sides of the uplift in the coalfields of N. England. The loftiest summits are Cross Fell, 2,893 ft., Mickle Fell, 2,591 ft., Wharfedale, 2,414 ft., Ingleborough, 2,373 ft., and Kinder Scout, 2,088 ft. In 1947 it was announced that the minister of Town and Country Planning had approved the so-called "Pennine Way," a 250-mile footpath from the Peak to the Scottish border.

Pennisetum. Genus of mostly annual grasses of the family Gramineae. They are natives of tropical and sub-tropical regions, and are grown chiefly for ornament, many of the species forming handsome tufts, with arching leaves and plummy flower-spikes.

Pennsylvania. State of the U.S.A., known as the Keystone state, owing to its central position among the 13 original states along the Atlantic coast. Its area is 45,333 sq. m., and it lies adjacent to the states of New York, New Jersey, Delaware, Maryland, West Virginia, and Ohio. Philadelphia, the chief city, on Delaware R. (the latter forming part

of the E. boundary) is the third largest city in the U.S.A., and second greatest port.

The surface varies from the flat country of Lancaster, Chester, and Bucks cos., to the ridges of the Allegheny Mts. Besides the Delaware, the chief rivers include the Susquehanna and Ohio systems and tributaries of the Potomac. It is traversed by various ranges of the Appalachians, one sector of which extends through the centre from N.E. to S.W. and another in the W., the highest point being Mt. Davis (3,213 ft.).

Possessing immense mineral wealth, Pennsylvania is responsible for half the nation's steel output, and one-third of the coal. Pittsburgh is the greatest single iron-and-steel producing centre. In a 500 sq. m. area in the N.E. is the world's largest anthracite deposit. Important industrial areas comprise those of Philadelphia-Camden, Pittsburgh, Reading, Scranton, and Wilkes-Barre; other centres include Chester, Altoona, Johnstown, Lancaster, York, and McKeesport.

The state leads in buckwheat production; other farm products include eggs, winter wheat, maize, oats, rye, potatoes, tobacco, and fruits. Half of Pennsylvania is forested. There are 16 rly. systems, including the Pennsylvania, New York Central, Erie, and Baltimore, and Ohio.

The state has 105 institutions of higher education, of which the best-known include the universities of Pennsylvania and Pittsburgh, Pennsylvania State College, and Bryn Mawr and Swarthmore College, the last two being women's colleges.

The Delaware valley and adjacent lands were claimed by the English, Dutch, and Swedes, but the latter made the first permanent settlement on the site of Chester in 1643. This region came under Dutch control in 1655 and under British after New Netherland changed hands in 1664. Pennsylvania's growth as an individual state was due to William Penn, who gave it that liberal and democratic basis which helped its rapid development. The old proprietary government was converted into a state in 1776, this constitution being revised in 1790. Lancaster succeeded Philadelphia as the capital in 1799, and Harrisburg became the capital in 1812. The state sends two senators and 33 representatives to congress. Pop. 9,900,180. Consult Penn-

sylvania: a History (4 vols.), G. P. Donahoe, 1926.

Penny. British bronze coin, one-twelfth of a shilling. Originally the penny was a silver coin, of which 240 weighed a pound, in imitation of the Roman denarius. Hence the pennyweight (dwt.), the 240th part of 1 lb. troy. Also known in Anglo-Saxon times as the *sceat*, it is called penny (A.S. *pening*, *pending*, perhaps meaning little pledge) in the laws of Ine (q.v.). Until the reign of Edward I the coin was indented with a cross, enabling it to be divided into half-pennies and farthings. Silver pennies were coined until the reign of Charles II, but steadily decreased in weight. The first copper pennies were struck by Charles II in 1665. The coin was designed by Philip Roetier, who used as model for Britannia on the reverse Frances Stuart, mistress of Charles and later duchess of Richmond (Pepys's diary, Feb. 25, 1667). In 1672 copper half-pennies and farthings were coined. The bronze-alloy penny was introduced in 1860. A penny is legal tender for amounts up to one shilling only. Silver pennies are no longer struck except for issue as royal alms on Maundy Thursday. The Royal Mint annually strikes an average of 60,000,000 pennies; but in 1923-24-25, 1933, 1941-42-43, none was struck. See Numismatics.

Penny Bank. Name given to a class of savings bank that receives deposits as low as a penny. Many such were established in Great Britain during the 19th century, including the National Penny Bank, and later they were set up in connexion with elementary and other schools. In some cases arrangements are made by which the money invested can be transferred to the P.O. Savings Bank. One of the largest is the Yorkshire Penny Bank. See Savings Bank.

Penny-farthing. The popular name given to the "ordinary," an early type of bicycle. Introduced in 1870, it had a front wheel much larger than the rear wheel. The name penny-farthing was given long after the machine had gone out of use, and was due to the comparison between the two wheels in size. See Bicycle illus.

Penny-royal (*Mentha pulegium*). Perennial herb of the family Labiatae. A native of Europe, N. and W. Asia, and N. Africa, it has a creeping rootstock, and branching, leafy stems. The small leaves are oval or oblong, with toothed edges. The tubular,

two-lipped, lilac flowers are borne in whorls around the upper part of the stems. From the fresh tops and leaves an oil is distilled which is used in medicine.

Pennywort or **PENNY-LEAF.** Name given to a wall plant known as the Wall Pennywort (q.v.); also to the white-rot or marsh pennywort (*Hydrocotyle vulgaris*).

Penobscot.

Largest river of Maine, U.S.A. Rising close to the Canadian border, it flows E. to Chesuncook Lake then S.E., and finally S. to the Atlantic, which it enters through Penobscot Bay. It is about 360 m. long and navigable for 25 m. Bangor is at the head of

tidal water. Many paper and pulp mills are dependent on the river for water power; the greater part of the basin, 8,500 sq. m., is forested. Penobscot Bay is divided into two portions by a chain of islands, which are covered with the estates of summer residents. The bay is 30 m. long, 21 m. wide.

Penology (Gr. *poine*, punishment; *logos*, science). Study of the punishment of criminals. With every advance in civilization the punishment and reclamation of the criminal have proceeded on lines which have mitigated force and substituted methods of reformation. The death penalty, torture, solitary confinement, and segregation were all obvious forms of forcible repression of crime, by striking terror into the mind of the criminal, which were tried from the earliest times. Russia with her Siberia, France with her Îles du Salut, and Great Britain with her penal settlements in America and Australia, are notable instances of repression by segregation. At the beginning of the 19th century in the British Isles there were some 200 offences punishable with death, and a corresponding state of affairs existed in other countries.

The failure of severe punishment to prevent many minor crimes, the large number of recidivists, and the insanitary and evil atmosphere of prisons of that date turned the attention of reformers to other methods. John Howard, Elizabeth Fry, William Wilberforce, and others began to study and suggest reforms, which culminated in the 20th cen-

tury in a very marked change in the treatment of criminals, including the abolition of capital punishment (q.v.) in some countries and its suspension in others. See Prison and Prison Reform.

Penrhyn. District of Carnarvonshire, Wales. It adjoins Bangor, being near the N. entrance to the Menai Strait. It is chiefly known



Penrhyn, N. Wales. Keep and garden front of the 18th century castle
Penrhyn

for its connexion with the slate quarries, the slate being shipped from Port Penrhyn on the strait. Penrhyn Castle, the seat of Lord Penrhyn, stands in a park, 7 m. in circumference, through which the Ogwen flows. An imposing building, it was erected late in the 18th cen-

tury; of Mona marble, it is in the Norman castellated style. One of the Welsh kings is said to have had a palace here.

Penrhyn or **TONGAREVA.** Coral atoll in the S. Pacific, belonging to New Zealand. It is 720 m. N. of Rarotonga in the Cook Islands—about lat. 9° S., long. 158° W.—and is noted for its pearl fishery. The lagoon has an area of 90 sq. m., a quarter of which is covered with pearl shell. It was discovered in 1788 and annexed to New Zealand in 1901. Pop. 654.

Penrhyn Powder. A typical high-density permitted explosive. It contains 7-10 p.c. nitroglycerine and about 60 p.c. ammonium nitrate, and is used for blasting hard coal or driving through softer rock. See Permitted Explosives.

Penrith. Urban dist. and market town of Cumberland, England. It stands on the Eamont, 18 m. S.E. of Carlisle, and is served by rly. The road A6 passes through on the way to Scotland. S. Andrew's church has an old tower. There are a 14th century grammar school and the ruins of a castle. Two inns are old buildings, one showing a room in which Richard III slept. In the neighbourhood are Edenhall and Brougham Castle, while there is a fine view from Penrith Beacon, 940 ft. high. The chief industry is brewing, and there is a trade in the agricultural produce of the district.

Penrith is a very old place and was given a fair and market early in the 13th century. One of the Nevilles, then lords of the town, built the castle as a defence against

the numerous raids of the Scots. In the 18th century clocks and watches were made here, while cloth and linen were woven on hand looms. Market day, Tues. Pop. 9,850.

Penrith. Town of New South Wales, Australia, in Cumberland co. It is 34 m. W. of Sydney by rail, and stands at the foot of the Blue Mountains in the valley of the Nepean river. It is one of the oldest settlements in Australia. Pop. 4,000.

Penrose, DAME EMILY (d. 1942). British educationist. She was educated at Somerville College, Oxford, and was the first woman to obtain a first class in classics. In 1893 she became principal of Bedford College, and in 1897 head of Royal Holloway College (later a school of London university). Principal of Somerville from 1907, she retired in 1926, and was created D.B.E., 1927. She died Jan. 26, 1942.

Penry, JOHN (1559-93). Welsh writer, a native of Brecknockshire. He was imprisoned in 1587 for writing a pamphlet describing the immorality then prevalent in Wales. In 1588 he set up a printing press which he moved about the country, and from which he issued the Martin Marprelate pamphlets. Forced to flee from Scotland in 1590, he returned to preach at a separatist church in London in 1592. Penry was hanged May 29, 1593. A Life, by W. Pierce, appeared in 1923.

Penryn. Mun. bor. and market town of Cornwall, England. It stands on the estuary of the Penryn river, which here falls into Falmouth Harbour, 2 m. N.W. of Falmouth, and has a rly. station. The chief industries concern stone and concrete products, market gardening, and distribution of cereals, also granite which is polished here and exported. Penryn has a town hall and a parish church. Here are the ruins of Glasney Church, a collegiate foundation, once a centre of literary activity.

In the Middle Ages Penryn was a flourishing seaport. It was made a borough in the 13th century, was granted fairs and markets, and had a considerable foreign trade. From 1553 to 1918 it was separately represented in parliament, Falmouth being united with it for this purpose from 1832. It is adminis-



Penryn arms



Penshurst, Kent. Penshurst Place, the mansion of Lord de L'Isle and Dudley, where Sir Philip Sidney was born in 1554

tered by a mayor and corporation. Market days, Thurs. and Sat. Population 4,000.

Pensacola. City and port of entry of Florida, U.S.A., the co. seat of Escambia co. The fifth largest city in the state, with a fine natural deep-water harbour defended by three forts, it stands on Pensacola Bay, about 6 m. from the gulf of Mexico and 50 m. E. by S. of Mobile, Alabama, and is served by the Louisville and Nashville and other rlys., by several lines of steamers, and by an airport. Here are a navy yard, est. 1824, and a naval hospital; Pensacola navy air station, largest aviation training school in the world, lies near. The city trades in coal, fish, cotton, and timber. Settled by Spaniards in 1696, it was alternately in the hands of the French, Spaniards, and British before it was acquired by the U.S.A. in 1821. In 1861 the Confederates held the navy yard for a time. Pensacola became a city in 1895. Pop. 37,449 (about a quarter negro).

Pensacola Bay. Inlet on the coast of Florida and Alabama, U.S.A. Escambia Bay and East Bay are extensions on the E. side of the bay, which is 12 m. long and 2½ m. in average breadth, and has an entrance breadth of less than 1 m. Its mean depth is about 30 ft. One of the largest harbours in the Gulf of Mexico, it is a winter rendezvous of the U.S. navy. On its banks are tourist camps.

Penshurst. Village of Kent, England. It is 5 m. S.W. of Tonbridge, and 33½ m. S.S.E. of London, with a rly. station, 2 m. N. The church, dating from about 1200, but much restored, has old brasses and other monuments. The village hall and club are modern. Penshurst's chief glory is Penshurst Place, which, with its park of 350 acres, has inspired poets from the days of Jonson and Waller to those of E. B. Browning and Swinburne. Heterogeneous in architecture, with grey walls and battlemented towers encrusted with lichen and moss, its feudal hall 64 ft. long, has a central hearth and steep, timber-supported roof.

The manor, once owned by the family of Penchester or Pencestre—there is an effigy of Sir Stephen de Penchester in the church—became the property of Sir John de Pulteney (d. 1349), who built the hall, Humphrey, duke of Gloucester, and others. It passed in 1552 to Sir William, grandfather of Sir Philip Sidney, the hero of Zutphen, whose descendants still possess it. Pop. 1,673.

Pension. Periodical payment made to a person, usually after retirement from regular work. Originally pensions were granted by the king, by members of the nobility, and by the rich to those who had served them faithfully, to scholars, artists, etc., who had sought their patronage, and to less wealthy friends and dependants. One British king—Charles II—became a pensioner of the king of France. In contemporary society most pensions are paid out of corporate funds or income, administered by the govt., local govt. authorities, boards of directors, and other bodies.

The possibility of qualifying for a pension is a condition, often an attraction, of many forms of employment, both in the public service and in industry and commerce. There are, however, two types of pension: those which become payable after a prescribed number of years of service or after disability consequent on service; those which are payable only when the individual has attained a prescribed age, usually not less than 60 years. The former are commonly called service pensions; the latter, superannuation pensions.

In the U.K., service pensions are payable to members of H.M. forces, the police, H.M. prison service, and similar services at home and abroad, where physical fitness is indispensable for effective service. Superannuation pensions are general in other cases. A minimum length of service is prescribed. The pension to be paid is normally calculated at the rate of 1/60 or 1/80 or other fraction of the salary for each year of service, subject to a stated

maximum. The superannuation scheme may provide for a lump sum to be paid on retirement, for a disability or "breakdown" allowance before the attainment of pensionable age, and for some payment to a widow or other dependent. The pension may be conditional on retirement, at least from employment paid out of public funds. A service pension is not as a rule affected if the pensioner takes up other work.

Pensions may be non-contributory or contributory. Contributory pension schemes are usual outside the forces and the civil service. Non-contributory pensions can be regarded wholly as a form of deferred pay.

Forces and Civil Service

Pensions payable to members of H.M. forces are varied from time to time by royal warrant or order in council. The conditions in the different branches of the services are set out in the relevant regulations of the service. Pensions to civil servants are governed by a number of Superannuation Acts, 1834 to 1935. To become eligible for a pension a civil servant must be appointed to an established office and either be appointed directly by the crown or be admitted with a certificate of appointment from the civil service commissioners. In 1938 more than half the total of persons employed in the civil service were unestablished, that is, non-pensionable. The pensions of teachers in state schools are governed by the rules made under the Teachers' Superannuation Act, 1937. Those of employees of local govt. authorities are subject to the Local Government Superannuation Act, 1937. Such bodies as the B.B.C., the transport commission, the electricity commission, and the national coal board have each their own pension scheme.

Most contributory pension schemes of public bodies involve (a) contributions from employees, (b) contributions from employers, and (c) sometimes contributions from H.M. Treasury, the three sets of contributions being paid into a pension fund, the balance of which is invested. Contributory pension schemes organized by private businesses, however, frequently take the form of a group pension insurance. When this is so, the contributions of employees and employers are paid to an insurance company, which assumes responsibility for the payment of the pensions.

The association of pension rights with a particular employer tends to restrict the mobility of labour. A person who can take fresh employment only by sacrificing, say, ten years of his pension qualification is much less inclined to transfer than he would otherwise be. For this reason the growing practice of private pension schemes is not without serious economic disadvantages. Speaking generally, civil servants, teachers, and local govt. officers can transfer within the service or from one branch to another without total loss of pension rights. That is not the case within banking, insurance, or commerce or industry generally.

In the U.K. an ex-cabinet minister can claim a pension. An ex-lord chancellor is entitled to a pension of £5,000 a year, irrespective of the term of office: this is compensation for surrendering professional income either as a judge or as a barrister when assuming this political office, which may be held for only a short time. A judge of the high court may be granted a pension of two-thirds of his salary after 15 yrs.' service or on earlier disability. County court judges may qualify according to their length of service for a pension up to $\frac{3}{4}$ of their salary. The holder of a Victoria Cross is entitled to a pension of £10 a yr., which may be augmented to £75 in case of need.

OLD AGE PENSIONS IN THE U.K. The harshness with which poor relief was administered in the 19th century focused attention on the plight of the aged poor; and towards the end of the century various committees and commissions considered what could be done to alleviate their lot. In 1908 the Old Age Pensions Act, effective from Jan. 1, 1909, was passed. Under it a man or woman of 70 yrs. of age could qualify for a weekly pension varying, according to the other income possessed, from 1s. to 5s. a week. The pensions were payable out of state funds. By March, 1909, there were 500,000 old age pensioners. During the next 38 yrs. the amount of the pension was from time to time increased.

In 1925 the Widows, Orphans, and Old Age Contributory Pensions Act established the first national scheme of contributory pensions payable at 65 yrs. of age. Under the National Insurance Act, 1946, a person who failed to qualify for a contributory retire-

ment pension might be granted a non-contributory old age pension, provided (1) he or she was a British subject or had been a naturalised British subject for 10 yrs., (2) was 70 yrs. of age or more, (3) had resided in the U.K. for at least 12 of the previous 20 yrs., (4) had a total yearly income (calculated according to certain rules) of not more than £89 5s. The amount of the old age pension varied according to this total income from a minimum of 2s. to a maximum of 26s. for one person and 42s. for a man and wife. (Consult pamphlet obtainable at any post office.) Non-contributory old age pensions were not to be granted to those becoming 70 yrs. of age after Oct., 1961. Under the Blind Persons Act, 1920, the blind became eligible for old age pensions at 50 yrs. of age, reduced in 1938 to 40 yrs.

Pensions for All

The National Insurance Act, 1946, which came into operation July 5, 1948, applied from that date to every person in the country who is over school-leaving age and under 65 yrs., if a man, and under 60 yrs., if a woman. It provided for the payment of retirement pensions, irrespective of means, to an insured man at 65 yrs. of age, to his wife at 60, and to any insured woman at 60. To qualify, the insured person must have paid 156 weekly contributions and have a yearly average of 50 contributions. The full retirement pension was 26s. a week for an insured person, and 16s. for an insured man's wife. From 65 to 70 for men, 60 to 65 for women, the pension was payable only on retirement from regular, normal employment; occasional earnings up to £1 a week entailed no reduction of pension. A person qualified for a retirement pension could increase the rate of pension ultimately payable by 2s. a week for each year of employment up to five continued beyond the retirement age.

OTHER COUNTRIES. A scheme of old age pensions was instituted both in Germany and in Denmark in 1891. In 1942 24 countries besides the U.K. had national old age pension schemes; these were generally contributory, although Australia, Canada, Denmark, France, S. Africa, and Uruguay granted non-contributory old age pensions subject to a means test, and New Zealand and the U.S.A. granted both types of pension. Norway had a universal old age pension

tax, the pension being subject to a means test. In the U.S.S.R. non-contributory old age pensions were paid to men at 60 after 25 years' service and in some industries at 50 yrs., and to women at 55 after 20 yrs.' service. Retirement is not a condition of pension. In Russia and in other countries except New Zealand and Eire, O.A.P.s were not at a flat rate for all classes of people, but were related either to the individual's earnings or to his income grade. See Insurance, National.

H. Watson

PENSIONS IN U.S.A. In 1947 the Veterans Administration, responsible since 1930 for carrying out congressional legislation regarding pensions for ex-service men, paid out \$1,731,972,783 to 2,354,297 ex-service men and 566,468 widows; 18,351 of these cases dated back to the Civil War, 3,087 to the Indian wars, and 47 to the Mexican war of 1856. Claims arising from such remote periods are due to marriages of ex-soldiers in their old age to young brides, who thereby became entitled to support as long as they themselves lived. In 1945 there was still on the rolls the widow of a man who fought in the war of 1812. At first, the award of a service pension depended upon the incurring of certain disabilities during military or naval service, however short. Later, service in war was accepted as a sufficient qualification. Pensions have been freely granted to men who served only a few weeks, never saw a battle, and never suffered from wounds or disease. In 1932 the U.S.A. was carrying on her pensions pay-roll as veterans of the First Great War 13,000 men who did not enlist until after the armistice of 1918. This was because peace between the U.S.A. and Germany was not officially ratified until July 2, 1921.

Many states of the union have granted civil old age pensions, payable from state funds or from county funds, or in part from each, helped by federal grants-in-aid authorised by the Federal Security Act of 1935. In several states there are mothers' pensions corresponding to British family allowances.

The most remarkable incident in the history of U.S. civil pensions was an agitation, started in 1934, during the great depression, by Francis E. Townsend, a Californian physician, who proposed an "old age revolving pensions plan," under which every U.S. citizen over 60 would receive \$200 a month for life, on condition that

he or she (1) retired from all paid employment, (2) had no criminal record, and (3) undertook to spend each month's instalment in the U.S.A. within 30 days of its receipt. Most of the cost was to be met by a tax on all sales, wholesale and retail. Within a short time 25 million signatures were appended to petitions asking congress to adopt this plan, and many elections were won by its advocates. The popularity of the scheme, which caused much worry in Washington, did not long survive a congressional committee investigation, which showed that its leading promoters were deriving large incomes from the funds of Townsend clubs.

Pensionary. Name of a former official of the Netherlands. He was so called because his remuneration was described as a pension. The chief Dutch and Flemish cities had their pensionaries, the first appearing in the 15th century. They were responsible for the business of the city, their duties being not unlike those of a town clerk. In the province of Holland there was in the 17th century a high official known as the grand pensionary or pensionary of the council, and he became one of the chief persons in the United Provinces. Although appointed only for a term of years, he was in importance second to the stadtholder. The office was abolished in 1795.

Pensions, MINISTRY OF. A British government dept. It was formed in 1916 to assess and pay the pensions of service personnel and merchant navy men disabled in wartime, and of the dependents of such men killed in war. During the Second Great War a civilian scheme was also introduced covering civil defence personnel. The ministry is concerned solely with pensions arising out of war; "service pensions" to retired members of the forces are administered by the dept. of the service concerned, and old age, widows', etc., pensions by the ministry of National Insurance. Head offices are at 18, Great Smith Street, Westminster, S.W.1.

Pentacle. Five-pointed star, drawn with a continuous line, used by occultists as a mystic emblem, and supposed to have power against evil spirits. It is also called a pentagram and a pentalpha.

Pentameter (Gr. *pente*, five; *metron*, measure). In prosody, a metrical line of 5 feet of whatever kind. In English heroic verse it consists of five accentual iambses. In classical elegiac verse, composed

of alternate hexameters and pentameters, the pentameter is divided into two clean-cut halves of 2½ feet each, of which the first may be dactylic or spondaic, but the second must contain two dactyls. Schiller defined the two in an illustrative distich which Coleridge rendered in English as follows:

In the hexameter rises the fountain's silvery column;

In the pentameter aye falling in melody back.

See Poetry.

Pentane. Hydrocarbon of the paraffin series (C₅H₁₂). It occurs in considerable quantity in American crude petroleum, and is prepared by purifying the fraction which distils over at 45° C. Pentane is employed in the standard lamp formerly used in testing the illuminating power of coal gas, a mixture of air and pentane vapour producing a light equivalent to that given by 10 standard candles.

Pentateuch (Gr. *pente*, five; *teuchos*, volume). Term used by Christian scholars from the time of Tertullian and Origen to designate collectively the first five books of the O.T. (Genesis, Exodus, Leviticus, Numbers, Deuteronomy). These books were called by the Jews "the five-fifths of the law." Some scholars contend that the sixth book (Joshua) is inseparable from the other five, and that it is better to use the term hexateuch. See Bible; Hexateuch.

Pentathlon. Series of five events in the athletic festivals of ancient Greece—foot race, long jump, throwing the discus and the javelin, and wrestling. A special prize was awarded to the competitor who excelled in the series.

Pentaur, POEM OF. Ancient Egyptian epic composition. Written by a court poet of unknown name, it describes Rameses II's Hittite campaign, culminating in the battle of Kadesh, about 1288 B.C. Versions were incised upon temple walls at Luxor and Karnak. From a papyrus copy made by a scribe of that name, now in the British Museum, authorship was mistakenly attributed to Pentaur.

Pentecost (Gr. *pentecostē*, the 50th). Jewish festival, also known as the Feast of Weeks. It is observed on Sivan 6-7, and was so called because it was celebrated 50 days from the morrow of the Sabbath after the Passover (*q.v.*). It coincides with the Christian Whitsuntide (*q.v.*).

Pentelicus OR PENTELIKON OROS. Mt. in ancient Greece, 12 m. N.E. of Athens. It was famous for its quarries of white marble, which are still worked.

Pentland Firth. Navigable strait separating the Orkney Islands from Caithness, Scotland, and connecting the North Sea with the Atlantic Ocean. Its passage is rendered dangerous by a strong tidal current flowing from W. to E. at the rate of from 6 to 10 m. an hr., and by eddies or whirlpools at the change of tide. The channel measures 14 m. in length and from 6 to 8 m. in breadth. The Pentland Skerries, at the E. entrance, consist of two islets, on one of which is a lighthouse, with light visible at 19 m., together with a number of smaller rocks.

Pentland Hills. Scottish hill range. It extends for about 16 m. south-west through Midlothian, Peeblesshire, and Lanarkshire, and has a breadth of from 4 to 6 m. The highest summits are Scald Law (1,898 ft.) and Carnethy (1,980 ft.). Springs in the hills provide Edinburgh with excellent water. See Edinburgh.

Pentlandite. Ore mineral of nickel, nickel iron sulphide, often approximating to 2FeS.NiS . It occurs as bronze-yellow masses or grains associated with nickeliferous pyrrhotite, niccolite, etc., at Sudbury, Ontario, and elsewhere.

Pentonville. Dist. of London. A ward of the bor. of Islington, and once part of Clerkenwell, it was, by gift of the Mandeville family, a possession of the priory of S. John of Jerusalem. It is named after the estate of Henry Penton, M.P. (d. 1812), which began to be built upon about 1773.

Pentonville prison, in Caledonian Road, was built to the plans of Sir Joshua Jebb in 1842. It was the first of what were known as model prisons for solitary confinement of convicts. The majority of executions in the London area were carried out at Pentonville. The prison was badly damaged in 1942 by German bombs, and the prisoners were transferred to Wandsworth and Wormwood Scrubs. It was later, during war conditions, used for the billeting of homeless civilians, and reopened as a prison in 1946.

Pentstemon. Genus of herbaceous plants, belonging to the family Scrophulariaceae, also known as Beard-tongue (*q.v.*).

Penumbra (Lat. *pene*, almost; *umbra*, shade). The lighter shadow surrounding the darker central portion (or umbra) of any shadow thrown by an opaque object illuminated by an extended source. It is specifically applied in astronomy to the shadow thrown by the earth or moon. Where the penumbra of



Penzance, Cornwall. Market Jew Street, the principal street of England's westernmost seaport

the moon falls on the earth, a partial eclipse of the sun is seen; within the umbra a total eclipse is seen; in an annular-eclipse of the sun the umbra of the moon falls short of the earth. See Eclipse.

Penza. Town of R.S.F.S.R., chief town of the region of the same name. It stands at the confluence of the rivers Penza and Sura, and is on the Morshansk-Syzran rly. It has been the centre of the timber trade, and manufactures matches and paper. Pop. 157,145.

Penzance. Mun. bor., market town, seaport, and watering-place of Cornwall, England. It stands at the head of Mounts Bay, 330 m. S.W. of London, and 10 m. N.E. of Land's End, and is the terminus of the British rlys. (W. region). The most westerly town in England, Penzance has a mild climate and is much visited in both summer and winter. In the public buildings are several museums, including that of the Royal Geological Society of Cornwall; other edifices are the free library and school of art, market house, and infirmary. There is an old market cross, the Morrab pleasure grounds, and a statue to Sir Humphry Davy, a native. Its harbour, formed by two piers, can accommodate large vessels, and has wet and dry docks. St. Michael's Mount can be visited from here, and it is the port of departure for the Isles of Scilly (*q.v.*). The industries include market gardening, fishing for mackerel and pilchard, and the shipping of tin, etc. Penzance began as a fishing

centre and later was made a port. It was damaged by the Spaniards in 1595, and was made a borough in 1614. From 1663 to 1838 it was one of the towns where tin was coined. The name is derived from two Cornish words, *pen*, head, and *zawn* creek. It has been assumed that it was derived from *sans*, holy, holy head; hence the head of S. John the Baptist which appears in the seal. Market days, Tues. and Thurs. Pop. 20,019.

Peonage (Sp. *peon*, a day-labourer). Term used for the system of labour once prevalent in Spanish America. Under the system the Indians were given the status of minors by the Spanish government, with the intention of protecting them from oppression. It had exactly the opposite effect. The system spread to the U.S.A., but was abolished in 1867. The name peon still survives in South America for a workman of native or mixed blood.

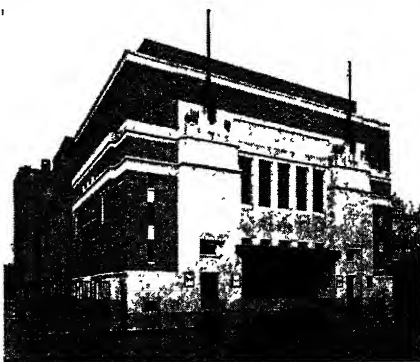
Peony (*Paeonia*). Genus of hardy perennial herbs, some of which are evergreen, of the family Ranunculaceae. They are natives of Asia, S. Europe, and America. *P. officinalis* and *P. albiflora* were introduced into Great Britain in 1548. They range in height from 2 to 5 ft., and their colours vary from white to crimson, though there is a yellow variety. They are raised from seed sown in autumn, in pots or pans of sandy soil in cold frames, and planted out in the spring. The taller species (*P. moutan*), known as the tree peony, also as the Chinese or mountain peony, should be planted in spring in deep, rich soil, and protected from frosts with a layer of fern, bracken, straw, or other similar material.



Penzance. Seal of the borough council



Peony. A Chinese variety, *Paeonia lutea*



People's Palace, Mile End Road. The building in east London, opened in 1888 to replace its predecessor, which had been burned down 1881

People's Palace. Institution in Mile End Road, E. London, England. The original foundation was a bequest by J. E. B. Beaumont (1774-1840), to provide for the recreation and moral and intellectual advancement of the working classes in the East End of London. Large donations to the endowment fund were subsequently made, the Drapers' Company being a conspicuous benefactor, and by June, 1886, a sum of £75,000 had been raised. The original buildings, opened by Queen Victoria in 1887, included the large Queen's Hall. This was destroyed by fire in 1931, and a new building was opened in 1936. From 1945 to 1948 it was leased to the B.B.C. Later it resumed the performance of plays and the giving or orchestral concerts for the people of E. London. Sir Walter Besant (*g.v.*) took an active interest in the founding of the People's Palace, of which he gave a suggestive forecast in his novel, *All Sorts and Conditions of Men*, 1882.

Peoria. City of Illinois, U.S.A., the co. seat of Peoria co. It stands on the W. bank of the Illinois river, 160 m. by rly. S.W. of Chicago, and is served by the Chicago, Burlington, and Quincy, and other rlys. It has a R.C. cathedral, and upwards of 400 acres of parks. It carries on a busy river trade, manufactures glucose, starch, flour, wagons, motor cars, foundry products, and agricultural implements, and is the leading whisky distilling centre in the U.S.A. Founded in 1819, and named after the Peoria Indians, Peoria became a city 1845. Pop. 104,969.

Pepi or **PERY.** Name of two Egyptian kings of the VIth dynasty. Pepi I, the Phiofs of Manetho, during a vigorous reign of 50 years (c. 2595-2542 B.C.), worked the Sinai turquoise mines and the

Assuan granite quarries, and undertook a maritime expedition up the Palestine coast. At Hieraconpolis Quibell unearthed a life-size bronze of him, with eyes of brilliant inlay, and an inscribed sceptre of pure copper. His son Pepi II is supposed to have reigned 94 years (2538-2444 B.C.).

Pepin or **PIPPIN.** Name of three Frankish rulers. Pepin I was mayor of the palace to the king of Austrasia early in the 7th century. His grandson, Pépin II, or Pepin of Heristal, made himself the most powerful person in the Frankish kingdoms, both of which, Neustria and Austrasia, came under his sway, although he did not dethrone the existing kings. He died Dec. 16, 714. His grandson, Pepin the Short, was the son of Charles Martel and the father of Charlemagne. In 751 he removed the Frankish monarch Childeric and made himself king, thus paving the way for the empire of Charlemagne. He died Sept. 24, 768. See Carolingians; France; Franks.

Pepper (*Piper nigrum*): Climbing shrub of the family Piperaceae. It is a native of the E. Indies, and



Pepper. Leaves and pendulous flower sprays. Inset, fruit

has a wavy stem and large, broad oval, alternate leaves. The minute flowers—without sepals or petals—are crowded in hanging sprays. The little roundish red fruits ultimately become black, when they are the peppercorns of commerce. Ground to powder they form black pepper; white pepper is produced from fruit of which the outer fleshy coat has been removed before ripening. See Cayenne Pepper.

Peppercorn. Berry of the pepper plant, used as a synonym for something of little or no value. A

peppercorn rent is a term in English law for a nominal rent.

Peppermint (*Mentha piperita*). Strong-scented perennial herb of the family Labiatae. It is a native of Europe, and has creeping under-



Peppermint. Branch with foliage and flowers. Inset, single flower

ground stems which send vertical branches into the air. The opposite, coarsely toothed leaves are oval or broad lance-shaped, the flowers purple, in loose spikes. Oil of peppermint, extensively used as a gastric stimulant in certain forms of dyspepsia, is distilled from the leaves. See Mint.

Pepper-root (*Dentaria diphylla*). Perennial herb of the family Cruciferae. It is a native of N. America, and has a long branching rootstock. The leaves are divided into three oblong-oval, coarsely toothed leaflets, and the four-petalled flowers are white. The crisp rootstock has a hot, pungent flavour somewhat resembling that of watercress.

Pepper Tree (*Drimys aromatica*). Small aromatic evergreen tree of the family Magnoliaceae. A native of Tasmania, it has oblong leaves with transparent dots, and white flowers, the sexes being separate. The many-seeded, globular fruit is sometimes used as a substitute for pepper, but all parts of the tree are pungent to the taste. See Peruvian Mastic Tree.



Pepper Tree. Leaves and fruit. Inset, flowers

Pepsin. Type of proteolytic enzyme which attacks the peptide linkages of proteins to hydrolyse them into still complex but more readily diffusible proteoses and peptones. A pepsin is present in gastric juice which in the presence of free hydrochloric acid digests proteins, *e.g.* of meat; similar agents are common in plants, especially in seeds of *e.g.* hemp, flax, barley. For medicinal purposes it is extracted from the stomach of freshly killed pigs and the rennet bags of sheep. See Digestion; Pancreas; Trypsin.

Peptones. Substances formed by hydrolysis of proteins, *e.g.* by pepsin. They give positive results with all chemical tests for proteins. Those formed during digestion help to nourish and build up the tissues. See Pepsin; Protein.

Pepys, SAMUEL (1633-1703). English diarist and Admiralty official. Born in London, Feb. 23,



Samuel Pepys

After John Hayle in the National Portrait Gallery, London

1633, fifth son of John Pepys, tailor and member of an old East Anglian family, he was educated at S. Paul's school and Trinity Hall and Magdalene College, Cambridge. Befriended by a relative, Sir Edward Montagu, later earl of Sandwich, he held several offices in connexion with the Admiralty, including that of secretary. He was imprisoned in the Tower in 1679, and in the Gatehouse, Westminster, 1690, on flimsy charges. He represented Castle Rising, 1673, and Harwich, 1679, in parliament, and proved an untiring and patriotic official. He was master of Trinity House, 1676 and 1685; master of the Clothworkers' Company, 1677; and president of the Royal Society, 1684-86. Superseded in 1689, he died at Clapham, May 26, 1703,

and was buried in the church of S. Olave, Hart Street.

Among the MSS. preserved with Pepys's library at Magdalene College was that of his famous Diary, written in cipher, Jan. 1, 1659-May 31, 1669. In this work, the most intimate human document of its kind, he supplies a vivid picture of his own character, his insatiable inquisitiveness, meannesses, and vanity, reveals also his higher qualities, to which his brother diarist, John Evelyn, pays a warm tribute, and throws in valuable sidelights on the court, official, and social life of his time. He was a student of music, in which he found consolation in trouble, and was an inveterate playgoer. He suffered from stone and from failing eyesight. The Diary was first deciphered by John Smith, 1819-22, and first published 1825. *Pron.* Peeps.

Bibliography. Diary and Correspondence of Samuel Pepys, with Life and Notes by Richard, Lord Braybrooke, 4th ed., 4 vols., 1854; Do., Deciphered, with Additional Notes, Mynors Bright, 6 vols., 1875-79; Do., ed. with Additions by H. B. Wheatley, 10 vols., 1893-99, 8 vols., 1904; S. P. and the World He Lived In, new ed. 1905, and S. P., Citizen and Clothworker, 1897, H. B. Wheatley; S. P. as a Naval Officer, 1914, and S. P. and the Royal Navy, 1920, Tanner; Lives, E. H. Moorhouse, 1909; J. Drinkwater, 1930; A. Bryant, 1933-35.

Perak. State of the federation of Malaya, on the W. coast of the Malayan pen. with Kedah to the N., Kelantan and Pahang to the E., and Selangor to the S. Formerly one of the Federated Malay States, it completely surrounds the Dindings, a detached part of Penang (*q.v.*). The chief river is the Perak. Rubber is cultivated, especially at Matang, and rice and fruit grow in the valleys. Tin is mined at Taiping and Ipoh. The main W. trunk road and rly. pass through the state by way of Taiping, Kuala Kangsar, and Ipoh, with branch lines to Matang and Teluk Anson.

In 1826 Great Britain and Siam agreed by treaty that the native ruler of Perak should be left undisturbed. In 1874, by the treaty of Pangkor, the sultan agreed to the appointment of a British resident. The next year



Perak, Federation of Malaya. Characteristic scenery on the Perak river

the resident was murdered; British troops sent in to restore order were eventually replaced by an armed police.

The area of Perak, including the Dindings, is 7,980 sq. m. The pop. was estimated in 1941 at 992,691. Perak was attacked by the Japanese in the Second Great War, Dec., 1941. A column pushing S. from Kedah and Province Wellesley was joined by another driving across the peninsula down the Grik road towards Kuala Kangsar, and on Dec. 29 British troops evacuated Ipoh. Early in Jan., 1942, the Japanese forced the Bernam river, and held the whole of Perak until Japan's surrender in Aug., 1945. See Malaya, Federation of.

Per capita: Per stirpes (Lat., by heads; by stocks). Terms used by lawyers in dealing with questions of inheritance. An example will best illustrate the meaning. X, by his will, leaves his property to trustees, to pay the income to his three children, A, B, and C, for life, and after their death amongst their children *per stirpes*. A has one child; B has two children; C has three children. A's child will inherit one-third; B's two children one-third between them; and C's three children one-third amongst them. Had the division been *per capita* and not *per stirpes*, all the six grandchildren of X would have had equal shares.

Perception (Lat. *per*, through, thoroughly; *capere*, to take, grasp). A philosophical term with various meanings. It was formerly used for cognition (knowledge), or as the equivalent of consciousness generally. Again, it was limited to the act of perceiving anything by the senses. More accurately, it is the mental process which refers sensations to an object identified as having aroused previous similar sensations—a chair, table, tree. Perception is more complex than mere sensation (*q.v.*)

and involves earlier experience; it is more stable than the idea of a thing, which in the absence of the object is liable to modification. Perception is less definite than apperception (*q.v.*). See *Metaphysics*.

Perceval, Sir. In medieval romance, a knight of the Arthurian cycle and central figure of one of the Grail romances. The son of a knight who has been slain, he is brought up by his mother in the forest, where he grows up uncivilized. Brought to court, he slays an enemy of the king, and after many adventures recovers his father's estate. See *Grail*, *Holy*.

Perceval, SPENCER (1762–1812). British statesman. Born Nov. 1, 1762, second son of the 2nd earl of Egmont, he was educated at Harrow and Trinity College, Cambridge. After some progress at the bar, he entered parliament as Tory member for Northampton



Spencer Perceval,
British statesman

in 1796. As a debater he proved himself an able opponent of Fox. On Pitt's retirement in 1801 Perceval became solicitor-general, and attorney-general in 1802. He was leader of the house after Pitt's death in 1806, and became chancellor of the exchequer in 1807, to which office was added that of premier in Sept., 1809. Perceval was assassinated in the lobby of the house of commons on May 11, 1812, by Bellingham, a crazy bankrupt.

Perch (*Perca fluviatilis*). Fresh-water fish of the order Perciformi. It is a native of the U.K.,



Perch, a fish common in European
and North Asiatic rivers

the greater part of Europe, and much of N. Asia. It is distinct in form, having a somewhat oblong body with the back humped above the pectoral fins. There are two dorsal fins, of which the anterior is the more conspicuous, both from its superior size and its strong, sharp-pointed rays. The back is coloured a dark ashy green, paling along the

sides to a whitish tint below. At intervals along the sides is a series of broad vertical bands of dark brown; whilst the ventral, anal, and tail fins are some tint of red. Ordinarily the perch attains a length from 9 to 12 ins., and a weight of 2-3 lb. See *Climbing Perch*; *Fish*.

Perch (Lat. *peritica*, a pole). Measure of length, an alternative name for the rod or pole. See *Rod*.

Perche, COL DE LA. Pass of the Pyrenees. It lies on the frontiers of France and Spain, beyond Mont-Louis, and between the valleys of the Têt and the Segre. Its height is 5,175 ft. The Spaniards were defeated here by the French in 1793.

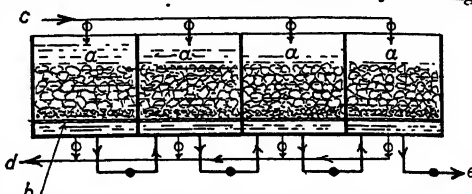
Perched Blocks. In geology, name given to isolated rocks which have been transported by glacial action and left perched on an apparently insecure base. Such rocks, often also called erratic blocks, occur typically in glaciated districts, and are found in N. Europe, the Alps, and parts of Great Britain.

Percheron. French breed of heavy draught horse, named from the old province of Perche (now the depts. of Orne and Eure-et-Loir). Of a grey colour and standing about 16 hands, it has a large but neat head, magnificent neck, and clean limbs. It has been well described as a trotting cart-horse. Percherons were much used for the horse-drawn omnibuses of London. See *Horse colour plate*.

Perchloric Acid (HClO_4). Colourless, fuming, volatile liquid obtained by the action of sulphuric acid on potassium perchlorate. When a few drops of the acid are placed on paper or wood they at once set it on fire.

Percival, JOHN (1834–1918). British schoolmaster and cleric. Born at Brough, Westmorland, son of a yeoman, he was educated at Appleby and Queen's College, Oxford. He was ordained in 1860, and became a master at Rugby. In 1862 he was chosen first headmaster of Clifton College, and the creation of this public school was the great work of his life. President of Trinity College, Oxford, 1878–87, he then became headmaster of Rugby until 1895. Then he was made bishop of Hereford, and remained there until his death, Dec. 3, 1918. Percival was an advanced Liberal in lay and ecclesiastical politics and in theology.

Percolation. Process of driving vegetable matter of its soluble constituents, by allowing



Percolation as applied in the manufacture of soda. See text

a solvent to trickle slowly through. The method is used in pharmacy for exhausting vegetable drugs of their active constituents, and the same principle is used in preparing coffee as a beverage. The vessel used is called a percolator. The figure shows how the principle of percolation is applied in the manufacture of soda in Shanks's vats. Ball soda or caliche, *a, a, a*, rests on a layer of ashes on the perforated false bottom, *b*, of the percolator. Fresh water is supplied through pipes, *c*, while *d* is a drain for weak liquor or waste water. The water percolates from vat to vat and finally issues at *e* as strong liquor.

The term is also applied when surface water, *e.g.* rain, passes downwards through the soil. Estimates of natural percolation, expressed as a depth in hundredths, etc., of an inch of water, are usually obtained by drawing off daily the amount which drains through a cu. yd. of earth contained in a metal gauge.

Percussion. Musical term applied to the sounding of a discord after preparation and before resolution. Percussion instruments are those in which sound is set up either by being struck with sticks (gong, and all drums), hammers (pianoforte, dulcimer, glockenspiel, xylophone, etc.), a steel rod (triangle), or clappers (bells), or, being in pairs, by being struck against one another (cymbals, castanets, etc.). Most of these have definite pitch of varying compass, but the gong, bass and side drums, tambourine, triangle, cymbals, and castanets are merely noise-producers. Percussion bands (drums, cymbals, triangle, tambourines, etc. with piano accompaniment) are often formed in schools in order to train the sense of time and rhythm in young children.

Percussion Cap. Small case of explosive, which may be ignited by the shock of a blow and is used to convey ignition to the propellant charge of a gun or rifle. Fulminate of mercury was discovered

by Howard in 1799, and about 15 years later the first successful percussion caps were made. In the old muzzle-loading guns, the percussion cap was a separate copper case containing fulminate of mercury, which was placed on a hollow nipple, the bore of which communicated with the powder chamber. When the hammer fell, it exploded the fulminate, and the flash ignited the powder.

The next efforts to improve firearms were made with the object of combining powder, shot, and means of ignition in one cartridge, which could be inserted in the breech, and in 1836 the pin-fire breech-loader was introduced by Lefauchaux. In this construction a projecting pin at right angles to the main axis of the cartridge was driven in by the fall of the hammer, a pellet of fulminate being exploded by the shock and igniting the powder. Central-fire ammunition, in which a percussion cap was fixed in the centre of the base of the cartridge and used in central-fire hammer guns, was introduced by both English and French gunsmiths about 1853, but the first really successful gun on this principle was made by Daw, in 1861.

In modern ammunition this principle is retained, and the cap containing the composition is driven by the hammer on to an anvil held in a cage in the cartridge case. The flame produced on firing the cap brings about rapid ignition of the primer, which fires the main propellant. The composition is usually a mixture of mercury fulminate (20); potassium chlorate (34); antimony sulphide (43); and sometimes a small addition of sulphur and black powder. *See* Ammunition; Cartridge; Explosives.

Percy. Name of a noble English family. It was founded by William de Percy, who was granted large holdings in the northern counties by William the Conqueror. He died near Jerusalem in 1096. Henry, 12th Baron Percy, was in 1377 created earl of Northumberland. His son, Sir Henry, known as Hotspur (1364-1403), was among the supporters of Henry IV against Richard, being made warden of the east marches and justiciar of N. Wales. His deeds against the Scots at Otterburn, 1388, are celebrated in the ballad of Chevy Chase. In 1403 he rebelled against the king, declaring that Richard II still lived, but was killed at Shrewsbury, July 21, in battle against the royal forces. The story is told in

Shakespeare's Henry IV, part I. Twice forfeited, the estates were restored to the 4th earl in 1469. In 1537, as the heads of the family had taken part in the Pilgrimage of Grace, the title was lost, and it remained in abeyance until in 1557 Thomas Percy was created, by patent, Baron Percy, and the next day earl of Northumberland, which title again lapsed, through failure of heirs male, in 1670.

The line of the Percys was then continued through the duchess of Somerset, daughter of the last earl, to Algernon Seymour, her son, subsequently duke of Somerset. He died in 1750, as earl of Northumberland, and his son-in-law, Sir Hugh Smithson, Bart., was created duke in 1766. The succession passed to his son Hugh, who took the name of Percy. The present 10th duke is his descendant. Lord Eustace Percy, seventh son of the 7th duke, who was born March 21, 1887, became a diplomatist and was Conservative M.P. for Hastings, 1921-37. He was minister of Health, 1923-24; president of the board of Education, 1924-29; minister without portfolio, 1935-36. *See* Northumberland, Earl and Duke of; *consult* History of the House of Percy, G. Brennan, ed. W. A. Lindsay, 1902.

Percy, S. Esme (b. 1887). English actor. Born in London, Aug. 8, 1887, he was educated at Windsor and Brussels. His first appearance in England was at the Theatre Royal, Nottingham, 1904, with Benson's company, and in 1905 he played Romeo at the Royalty, London. He took many leading rôles in Shakespeare and Shaw. Having served in France during the First Great War, he remained in Germany with the army of occupation until 1923. In 1924 he became general producer to Macdonald's Shaw repertory. Percy, who lost an eye when attacked by a dog in 1937, was in great demand as a broadcasting actor.

Percy, Thomas (1729-1811). British prelate and man of letters. Born at Bridgnorth, the son of a



Thomas Percy,
British prelate

grocer, April 13, 1729, he was educated at Christ Church, Oxford. Devoting himself to the study of old literatures, he published, in 1765, the famous *Reliques* (v.i.). His translation of P. H. Mallet's *Northern Antiquities*, published in

1770, aroused a similar interest in old Norse records. Dean of Carlisle in 1778, and bishop of Dromore in 1782, he was an original member of Johnson's literary club, and died Sept. 30, 1811.

Percy's Reliques. Old songs, ballads, and other pieces prepared by Thomas Percy (v.s.) published in 1765 as *Reliques of Ancient English Poetry*. The foundation of his work was a folio MS. of about 200 poems, which had been compiled about the middle of the 17th century, and was found at Shifnal, Shropshire; but to the pieces selected from that folio Percy added many gathered from other sources, and also some later poems. Though he freely adapted and expanded poems, his work marks an important stage in literary history, the starting point of the modern study of ancient poetry, and a powerful factor in the romantic revival. The folio MS. on which he primarily drew is now in the British Museum; its full text was published 1867-68.

Perdiccas (d. 321 B.C.). Distinguished general of Alexander the Great, whom he accompanied in his Persian campaigns. On the death of Alexander in 323 B.C. he became chief minister to his successor, Arrhidaeus. He embarked on a campaign against Ptolemy, the ruler of Egypt, but this miscarried, and Perdiccas was put to death by his own soldiers.

Of three early kings of Macedonia of this name, the second played a part in the Peloponnesian war, first as an ally of Sparta, afterwards of Athens.

Perdita. Character of Shakespeare's tragi-comedy *The Winter's Tale*. The daughter of Leontes and Hermione, king and queen of Sicily, she is exposed at birth by the orders of her father, who doubts her paternity, on a desolate shore in Bohemia. Found by an old shepherd she is brought up as his daughter. Her speech on the flowers appropriate to different ages is celebrated. *See* Florizel; Robinson, Mary.

Perdu, MONT. Peak in the Pyrenees (q.v.). It is in the Spanish territory of Huesca, and lies S.E. of the Pic du Midi, its alt. being 10,994 ft. A glacier descends from the summit in three ridges.

Pereda, JOSE MARIA DE (1833-1906). Spanish author. He was born near Santander, Feb. 6, 1833, and began life as an engineer, turning to journalism and literature in 1858. *Escenas Montañesas* (Mountain Scenes), 1864, is a typical work. Pedro Sanchez, 1883, and

Sotileza, 1884, are perhaps his best works of fiction. He died March 1, 1906.

Père David's Deer (*Cervus davidianus*). Chinese species of deer. It is so named because it was

ancient Taphros, 60 m. S.E. of Kherson, on the N. of the isthmus. In the 15th century, Perekop formed part of the Tartar defences of the Crimea; it was captured by the Russians in 1783, and until the

Revolution was administered by the government of Taurida. During 1919-20 it was the scene of fighting between counter-revolutionaries and Bolsheviks. In the Second Great War German forces attacked the Russian positions on the isthmus which were breached Oct. 28, 1941. The town of Perekop was retaken by the 4th Ukrainian army, Nov. 1,

1943, the route of escape by land for the German forces still in the Crimea being cut off.

Père-Lachaise. Cemetery of Paris. Situated in the N.E. of the city, in the Boulevard de Ménilmontant, it is the oldest and largest extra-mural cemetery of Paris, covering about 212 acres. The ground occupied by it formerly belonged to the Jesuits, and the cemetery received its name from Père François de La Chaise (*q.v.*), who was superior of the order in Paris. On the suppression of the order the ground was sold and passed through a number of hands, until in 1804 it was purchased by the municipality and converted into a cemetery.

The cemetery is celebrated by reason of the famous people buried there, and its noteworthy monuments. On the right of the principal entrance is the Jewish cemetery, where the tomb of Elisa Rachel (*q.v.*) is the most noted. A little farther to the right is the tomb of Abélard and Héloïse. In a prominent central position is the handsome monument to Casimir-Périer. Other graves are those of Béranger, Balzac, La Fontaine, Molière, and de Musset among literary figures of France; Macdonald, Lefebvre, Masséna, Davout, Ney, and Foy among soldiers. Many English are buried here, including Sir Sydney Smith. A fine chapel occupies the site of the former Maison de Mont Louis, headquarters of the Jesuits. There is also a Muslim cemetery with a mosque. See Abélard; Bartholomé, P. A.; Cemetery; Paris.

Perennial. Plant that lives through a number of years. Trees and shrubs are all perennial, so the term is restricted in its application to herbaceous plants which live on from year to year, to distinguish them from annuals and biennials. The growth above ground of the true herbaceous perennial dies down in autumn, and fresh growth starts from the rootstock in spring. Some kinds form tufts of evergreen leaves. See Botany; Plant.

Perez, ANTONIO (1539-1611). Spanish statesman. An illegitimate son of Gonzalo Perez, the king's



Antonio Perez,
Spanish statesman

Père David's Deer, a Chinese species
W. S. Berridge, F.Z.S.

first noticed by the Père David in the emperor of China's park near Peiping. Its chief character lies in its antlers, which fork early into two equal branches, of which only the front one divides. See Deer.

Peregrine Falcon (*Falco peregrinus*). Bird of prey formerly much used for the sport of hawking. A native of Great Britain, and found in most other parts of the world, it nests chiefly on sea cliffs, and lays three or four mottled red-brown eggs. The young birds migrate in autumn to other lands. Adult birds have the crown of the head and the moustaches bluish black, the back and upper parts bluish grey, and the lower parts pale salmon colour barred transversely with brown. The size is about that of the rook, the male or tiercel 15 ins. in length, and the female a fifth larger. Exceptionally speedy, the bird is graceful in flight. Its prey is chiefly larger birds, including pigeons, grouse, and duck. See Eggs colour plate; Falcon; Hawking.

Peregrine Pickle. Novel by Smollett, published in 1751, with the full title of *The Adventures of Peregrine Pickle*, in which are included *Memoirs of a Lady of Quality*. It is a broadly humorous narrative, following the adventures of the hero from birth to marriage. The *Memoirs of a Lady of Quality*, which form the long 81st chapter, were written by Frances, Viscountess Vane (1713-88), who paid Smollett for their insertion in his story.

Perekop. Town and isthmus of Ukraine S.S.R. The town is the

murder of Escobedo, secretary of Don John of Austria, governor of the Netherlands, and was repudiated by Philip when inquiry into the murder was pressed. An attempt by the king's agents to remove Perez to a prison of the Inquisition was resented as an infringement of public rights, and Perez escaped into Aragon, where a popular movement in his favour led to drastic action by Philip. Perez, who had been sentenced to death in his absence, crossed the Pyrenees and organized an unsuccessful raid on Spanish territory. Later he became intimate with Bacon in England, but he died in Paris, Nov. 3, 1611. *Pron.* Payreth.

Perez de Ayala, RAMÓN (b. 1880). Spanish writer and diplomatist. Born at Oviedo, Aug. 9, 1880, he was educated at the university there. He entered the diplomatic service, and under the republic was ambassador to Great Britain, 1931-36. Then he was appointed director of the Prado museum at Madrid. An important Spanish novelist, he introduced backgrounds of Old Castile into his tales, which included *La Paz del Sendero*, 1904; *Prometeo*, 1916; *Luna de Miel*, *Luna de Hiel*, 1923, and its sequel, *Los Trabajos de Urbano y Simona*, 1923; *El Ombligo del Mundo*, 1924; *Tigre Juan*, 1926; *El Curandero de su Honra*, 1926. *Las Mascaras*, 1920, contains critical essays.

Perez-Galdos, BENITO (1843-1920). Spanish writer. He was born at Las Palmas, Canary

Islands, May 10, 1843, and published in 1868 *La Fontana de Oro*, the first of a series of books called *Episodas Nacionales* which dealt in fictional form with the history of 19th century Spain, and eventually comprised some 47 volumes, the last being completed in 1912. His other works included *Mariandela* and *Gloria*. He died Jan. 4, 1920.

Perfect (Lat. *perfectus*, complete). Musical term used in several senses: (1) Of intervals, the normal unison, octave, fifth, and fourth are reckoned as perfect, instead of major, owing to the simplicity of their ratios of vibration and their lowness in the harmonic series. (2) A perfect cadence is one in which the dominant chord is followed by the tonic chord. (3) Triple time was considered perfect by the musical theorists of the Middle Ages, and was indicated by a circle.

Perfect. In grammar, a tense of the verb denoting an act completed in time just past or still continuing, or a state or condition brought about by a previous action. Originally, it was a special kind of present; in "I have come to see" the action is past, but is continued in its effects. In most of the old Indo-European languages the perfect was formed by reduplication and vowel-change. In the Teutonic languages reduplication is very rare, and most of the oldest verbs simply change the vowel (give, gave), while so-called weak verbs add to the base (love, love-d, from "do"). The pluperfect (Lat. *plus quam perfectum*, more than perfect) indicates that an action was completed before another past action.

Perfectionism. Doctrine which teaches that it is possible for the Christian by the grace of God to be kept entirely free from sin. Similarly, Buddhists teach that by meditation and mortification a devotee may be entirely set free from sin. As a mere theory, the perfectibility of Christians is a matter of opinion in the Christian Church. The early Methodists, and some sects at the present day, urge it as a practical matter which concerns all true Christians. The doctrine is based upon the various precepts of the N.T., which urge Christians to aim at perfection.

Perfectionists. American sect, founded by John Humphrey Noyes about 1845. He established a community of his followers at Oneida (*q.v.*) in 1848. He taught a form of perfectionism, according to which the members of the community were so established in holiness

that they could neither fall into sin nor make any further spiritual progress. Whatever they did was good—a principle which introduced Antinomianism in its worst form. They practised community of wives as well as of goods, and had a system of "complex marriage" which was practically free love. They found it necessary in 1880 to abandon these communistic practices, and divided their property among the members, who became shareholders in the Oneida Community, Ltd.

Performing Rights Society. Association of composers, authors, and publishers of music, formed in 1914 to collect fees for the public performance of copyright works. It is a company limited by guarantee, makes no profits for itself, and pays no dividends, the whole of the fees collected, beyond the cost of administration, being paid to the composers, authors, and publishers concerned. It grants licences to public places of entertainment and to the B.B.C. by which, on payment of an annual fee, they may perform any of the works which the society controls. It does not grant licences to singers, orchestras, or bands. In all, 50,000 places of entertainment in Great Britain are thus licensed. The Society's offices are at Copyright House, 33, Margaret St., London, W.1.

Perfume (Lat. *per*, through; *fumus*, smoke). Scent arising from a sweet-smelling substance. In Egypt, different kinds of perfumes were offered on the altar at dawn, noon, and evening. Purification was carried out by the fumigation of temples and dwellings by the burning of scented substances. In their religious processions they burnt myrrh, cinnamon, iris, and other strong scented substances. Perfumes were pressed into the service of the dead, and the process of embalming was carried out with the costliest spices. The Hebrews took with them, from Egypt, the use of incense and other perfumes, and throughout Western Asia the use of perfumes was general for ceremonial and domestic purposes.

Perfume is obtained from the flowers, leaves, and in some cases roots and wood of plants and is extracted by steam distillation by expression (steeping in water and pressing by solution in petroleum ether with subsequent vacuum distillation), or by maceration, *i.e.* steeping in fat and filtering.

The production of perfumes is an important industry in the S. of

France. At Cannes jasmine, tuberose, and rose are the principal products. Nice is a centre for violets, and Nîmes for thyme, rosemary, and lavender. In Italy bergamot and iris are dealt with, and English mint and lavender are considered the best.

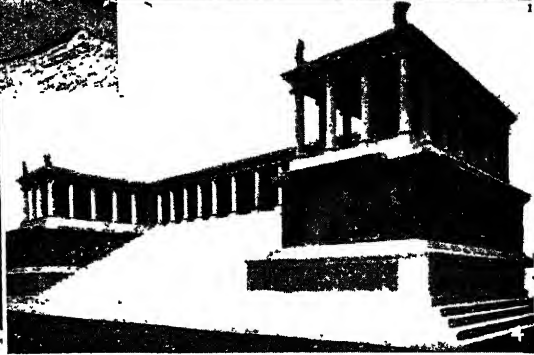
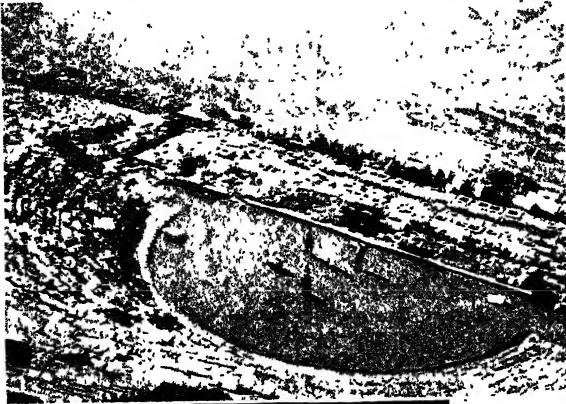
There are really two branches in the manufacture of perfumes, usually carried on in different centres: perfumery proper, which is naturally carried on chiefly on the spot, as the plants must be fresh to give the best results; and the mixing of the essences secured with fat for pomades and other preparations, with alcohol for liquid scents, and with various other materials for toilet preparations. As there is no means of scientifically assessing odours, and nomenclature is dependent on personal judgement, the art of the perfumer is a subtle one.

The rise of organic chemistry towards the end of the 19th century resulted in the isolation and, in many instances, the chemical synthesis of substances to which natural perfume materials owe their origins, *e.g.* essential oil of almonds is substantially benzaldehyde; vanilla owes its characteristic odour to methyl protocatechuic aldehyde, etc. Many new odorous materials were discovered, *e.g.* ionone (violet) and nitro musks. Later improvements in technique produced such substances as phenyl ethyl alcohol (contained in otto of roses), the tertiary alcohols and their esters, used for lilac, jasmine, hyacinth, etc.

Perga or **PERGE**. Ancient city of Pamphylia, and a centre of the worship of Artemis. It is memorable as a place visited by S. Paul on his first missionary journey. Its ruins lie about 10 m. N.E. of Adalia, Asiatic Turkey.

Pergamino. Town of Argentina, in the prov. of Buenos Aires. It is an important rly. junction, 76 m. S. of Rosario and 140 m. N.W. of Buenos Aires. Pop. 20,500.

Pergamum or **PERGAMUS**. Ancient city of Mysia, Asia Minor. The modern Bergama, it is situated about 20 m. from the sea, on the N. bank of the Caïcus. It became important in the first half of the 3rd century B.C., a kingdom being established there by Philetaerus in 280 B.C. The kingdom reached the zenith of its power under Eumenes II in 190 B.C., who was tactful enough to identify himself with the all-conquering Romans, and received from them most of W. and central Asia Minor. Under Eumenes the great library



Pergamum. 1. The imposing Greek theatre. 2. The ruined gateway to the Roman amphitheatre. 3. Statue of the Dying Gaul, an example of the Pergamene school, now in the Capitoline Museum, Rome. 4. Restoration of the south wing of the great altar of Zeus

was founded, said to rival that of Alexandria. He also beautified the city with fine buildings and sculptures. In 133 B.C. Attalus III, the last king, died, and by his will the kingdom passed to the Romans. Extensive excavations were made by the Prussian government, 1871-78. Among fine buildings found was the great altar of Zeus, with colossal reliefs of the battle between the gods and giants, which was taken to Berlin. Another famous example of the statuary of the Pergamene school is the Dying Gaul, falsely called the Dying Gladiator, in the capitol at Rome.

Pergola (Ital., arbour). Name given to a trellis erection spanning a garden walk, upon which flowers and creepers are trained. It was introduced from Italy. The best climbers for a pergola are vines, roses, honeysuckles, clematis, wistaria, aristolochia, and jasmine.

Pergolesi, GIOVANNI BATTISTA (1710-36). An Italian composer. Born at Jesi, near Ancona, Jan. 3, 1710, he studied composition at Naples and showed facility in extemporising chromatic passages on the violin. He became prominent with a sacred drama, *La Conversione di S. Guglielmo d'Aquitania*, 1731. Of great lyrical beauty is his *Stabat Mater*, probably composed in the year of

his death. Of his operas, notable for comic intermezzi, the most famous is *La Serva Padrona*, 1732. He died March 17, 1736.

Peri. In Persian mythology, a fairy-like being of a race between angels and demons. They are harmless and beautiful, but are excluded from Paradise. The story of Paradise and the Peri—told in Moore's *Lalla Rookh*—relates how one peri secured admission into the abode of the blessed.

Periander (c. 665-585 B.C.). Tyrant of Corinth, 625-585 B.C., and one of the seven wise men of

ancient Greece. Though at first his government was beneficent, he degenerated into an oppressive despot. Thrasybulus, tyrant of Miletus, consulted by him, is said to have taken the messenger through a cornfield, cutting off as he went the tallest ears of corn. Periander accordingly rid himself of the noble families of the city. He was a generous patron of art and literature, and founded colonies in Macedonia.

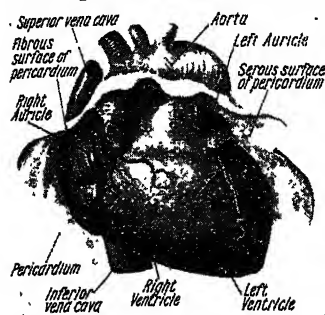
Pericarditis. Inflammation of the pericardium. It may occur in the course of Bright's disease, rheumatism, or fevers, or may result from injury, or an extension of inflammation from the lungs, heart, or other organs. Suppurative pericarditis may occur in the course of septicemia and pyemia. The most marked symptoms are pain, increase of pulse rate, difficulty in breathing, and coughing. Acute pericarditis may terminate in complete recovery, in sudden death, or in chronic pericarditis with the formation of adhesions and dilatation of the heart. Penicillin and the sulpha drugs are used in treatment where the condition is due to germs.

Pericardium (Gr. *peri*, around; *kardia*, heart). Fibro-serous membrane which encloses the heart. The base of the pericardium is



Pergola. An attractive pergola constructed from stone and wood

attached to the central part of the diaphragm or big horizontal muscle which separates the abdomen from



Pericardium. Diagram showing relative position of the pericardium to the heart

the thorax, and the apex surrounds the commencement of the aorta or main blood-vessel of the body. Immediately in front of the pericardium is the middle piece of the sternum or breastbone, and the cartilages of the fourth to the seventh ribs on the left side. The pericardium contains in health a small amount of lymph, the function of which is to lubricate the two surfaces and thus facilitate the movements of the heart.

Pericles (c. 490–429 B.C.). Athenian statesman. Son of Xanthippus, soldier and politician, he was born in Athens, and educated by the finest teachers. An aristocrat, he allied himself with the democratic party, and set out to destroy the system of despotic oligarchy. One of his first recorded public appearances was as a lawyer against Cimon, head of the aristocratic party. He worked with Ephialtes, leader of the popular party, to limit the power of the governing Areopagus in 462. The next year Ephialtes was assassinated, his colleague became supreme, and, after the downfall of Cimon, he was accepted for the next 30 years as the greatest man in the state.

Pericles wished to secure a mighty and prosperous federation of autonomous Greek states. But he was also a patriot, desiring to see Athens a strong central power round which the other states could rally. He was perhaps the first man to grasp that democracy depends for its success upon bold and resolute leadership, and that the ruled must maintain their interest in the ruling. Therefore he flung open all offices of state, in 457, to the poorest citizens; he provided salaries for the holders of offices and improved the ad-

ministration of justice by paying both magistrates and jurors.

A policy of expansion raised the prestige of Athens higher than ever. Pericles terminated the long Persian war by a truce in 453, recalling Cimon from exile. For the rest of his life Pericles was annually elected commander-in-chief. In 431 the Peloponnesian war broke out between Athens and Sparta. This was fatal to Athens, for reasons for which Pericles was in small part to blame. A naval disaster, followed by unsuccessful overtures for peace, completed the demoralisation of the Athenians, and they turned against their leader—in spite of his renowned funeral oration—deposed him from his magistracy, and fined him. His calm dignity restored him to favour, but his health was undermined, and in the autumn of 429 he died. He had made Athens the most celebrated city in the



Pericles, Athenian statesman
From a bust in the British Museum

world. To Pheidias he entrusted the supervision of the building of the Parthenon, Odeum, Erechtheum, Propylaea, and other public and sacred edifices.

Bibliography. Thucydides, books i and ii, are the chief sources; Plato, Aristotle, and Plutarch contain useful references. *Consult also* The Age of Pericles, W. W. Lloyd, 1875; P. and the Golden Age of Athens, E. Abbott, 1901; and a study by C. Mackenzie, 1937.

Pericles, PRINCE OF TYRE. Romantic play attributed to Shakespeare. The greater part was probably written by George Wilkins, Shakespeare's handiwork being seen chiefly in Acts 3–5. It is based on adaptations by John Gower and Laurence Twine of the early Greek romance of Apollonius of Tyre. The play deals with the loss by Pericles of his wife and daughter and their reunion. First

acted at The Globe in 1608, and popular as late as 1630, it has seen only few revivals. Wilkins, in 1608, published a novel which he said was based on the play. Pericles was first printed in 1609, but not admitted to Shakespeare's collected works until the second issue of the Third Folio in 1664.

Peridot. Variety of chrysolite or olivine, a magnesium-iron-silicate. Found in N. America, the Levant, etc., and alternatively known as Job's tears, peridot is always some shade of green. It commonly appears in the form of small pebbles, and is used as a gem.

Peridotite. Name given to a group of ultra-basic crystalline igneous rocks, rich in magnesia. They consist chiefly of olivine, together with augite, biotite, hornblende, hypersthene, and magnetite, etc. Quartz and feldspar are absent. Peridotites on decomposition pass into serpentine, most of which has been so formed. Corundum, platinum, red garnet, and diamonds are all found in peridotites. *See* Igneous Rocks; Olivine; Serpentine.

Perigee (Gr. *peri*, around; *gē*, the earth). Point in the moon's orbit at which the moon approaches nearest to the earth. The term is sometimes applied to the position of any heavenly body when it approaches in its orbit nearest to the earth. It is the opposite point of apogee. *See* Moon.

Périgord. One of the provinces into which France was divided before the Revolution. It is now represented by the depts. of Dordogne and Lot-et-Garonne. Before the 14th century it was feudatory to Aquitaine, and as such was an English possession. After the expulsion of the English it was united to the crown of France. *Pron.* Pay-ree-gor.

Périgueux. Town of France. The capital of the dept. of Dordogne, it stands on a height on the right bank of the Isle, about 80 m. E.N.E. of Bordeaux, and is a junction of the Orléans rly. It has locomotive works, and manufactures agricultural machinery, furniture, woollens, hats, etc. A considerable trade is carried on in wine, and truffles are a speciality. The cathedral of S. Front, 984–1047, built perhaps in imitation of S. Mark's at Venice, is a fine example of Byzantine architecture. Other important buildings are the church of S. Étienne and the prefecture. Périgueux, the ancient capital of the Gallic Petrocorii, was the Vesunna of the Romans, relics of whose rule remain in a great tower

and an amphitheatre. It was besieged by the English in 1356, and was sacked by the Huguenots, who occupied it from 1575 to 1581. Pop. 40,865.

Perihelion (Gr. *peri*, around; *helios*, the sun). In astronomy, the point in the orbit of a planet or comet at which it makes its nearest approach to the sun. It is opposite to aphelion, the farthest distance, the line joining the two being known as the line of apsides. See Aphelion; Apsides.

Perim. Rocky island in the straits of Bab-el-Mandeb under British control. It commands the entrance to the Red Sea, and is situated 97 m. W. of Aden. It is about 5 sq. m. in area, and is a coaling depot for the mercantile marine. It was held by the British 1799-1800, occupied 1857, and is now administered as a dependency of Aden. See Bab-el-Mandeb.

Perimeter (Gr. *peri*, around; *metron*, measure). Line or lines bounding a closed geometrical figure, or any area or surface. In a military sense it denotes the outer rim of a hastily fortified position, and consists of trenches, barbed wire, and light weapon pits. Notable examples in the Second Great War were at Tobruk and on the landward side of Dunkirk to cover the withdrawal of the B.E.F. An aerodrome perimeter is a road encircling the flying field and enclosing the runways; at military aerodromes it includes fortified posts.

Perineum. That part of the body which forms the external floor of the pelvis (*g.v.*). It may need repair after childbirth, during which it may suffer tearing.

Period (Gr. *peri*, around; *hodos*, path). Historically, a cycle of years or events, *e.g.* the Louis XV period, the Commonwealth period, etc. In astronomy, a definite cycle, like the lunar period or Metonic cycle of 19 years; also the time required for a celestial body to complete a revolution in its orbit, *e.g.* the earth's period is 365 days, etc. In mechanics, the interval of time between the same recurrent phases of an oscillation or vibration, *e.g.* that of a pendulum or a tuning-fork. The complete repetition of an alternating voltage is called a cycle or period. The term is also used for the completion of any series of recurring events, *e.g.* a sunspot period. The time of a complete roll of a ship from starboard to port or vice versa is termed a period, as is the interval between the beginning and full operation of a chemical re-

action. A periodicity is the regular recurrence of the same phenomena in the same times.

Periodical. Name given to any publication issued at regular intervals, though generally used in contra-distinction to a daily newspaper (properly a journal) to imply a weekly, fortnightly, monthly, or quarterly magazine. British periodicals were ordered to suspend publication for two weeks in Feb., 1947, during a fuel crisis. See Magazine.

Periodic Law OR PERIODIC TABLE. Conception in chemistry, first put forward in 1804 by J. A. R. Newlands. The numbers of chemical elements in the Periodic Table are given in p. 1987. See Chemistry; Mendeleev.

Perioeci (Gr. *perioikoi*, those who dwell around). Intermediate class in the Spartan state, descendants of the pre-Dorian population with an admixture of other elements. They were above the Helots (*g.v.*) or serfs, could farm their own land and engage in trade, but had not the political rights of the full Spartan citizens, though they were liable for military service. *Prom. Perry-oky.*

Periostitis (Gr. *peri*, around; *ostea*, bones). Inflammation of the periosteum or fibrous membrane which invests bones. Acute periostitis is most frequently the result of an injury. It may also develop from inflammation in the neighbourhood of the bone, *e.g.* periostitis of the jaw from a carious tooth. The symptoms are pain, and redness and swelling of the limb over the site of the inflammation. Penicillin and the sulpha drugs control the situation if the germs present react to them.

Peripatetics (Gr. *pervpatetikos*, walking about). Name given to the followers of Aristotle. They were so called either because their master and his successors were in the habit of delivering their lectures walking about in the Lyceum, or from its walks (*peripatoi*). The chief Peripatetics are Theophrastus, Eudemos, Aristoxenus, Strato, Andronicus of Rhodes, and Alexander of Aphrodisias.

Peripatus. Caterpillar-like animal about 3 ins. long with

structure intermediate between that of annelids and arthropods. It is believed to be related to the progenitors of all air-breathing Arthropoda. The cylindrical body has a soft, velvety skin; it is segmented and bears between 17 and 40 pairs of short conical limbs, each ending in a pair of hooked claws. Peripatus is green, brown, or reddish-orange above and flesh-coloured below. The head bears a pair of antennae, two simple eyes, and a pair of horny jaws. Breathing is by short air tubes over the general body surface. There are a central



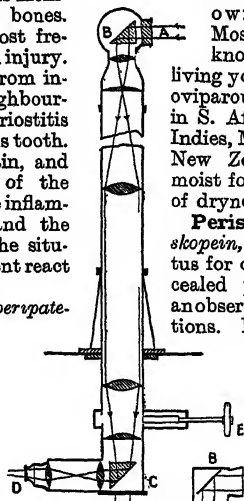
Peripatus. An animal intermediate between the Annelids and Arthropods

nervous system and a long tubular heart with lateral openings into the perivisceral blood-space.

Originally the creature was classed as a slug, owing to its copious ejection of slime, which serves to capture insects. Later thought to be a worm, it is now generally regarded as an arthropod

of a separate class of its own—Onychophora. Most of the 60 or more known species produce living young, only a few being oviparous. Peripatus occurs in S. Africa, S. America, W. Indies, Malaya, Australia, and New Zealand. It inhabits moist forests and is intolerant of dryness.

Periscope (Gr. *peri*, around; *skopein*, to watch). Apparatus for observing from a concealed position or enabling an observer to see over obstructions. It consists essentially of reflecting mirrors or prisms at each end of a metal tube. One mirror or prism receives from the object light which, after reflection, falls on the lower mirror, whence it is reflected in the direction of the observer's eye. The submarine periscope has additional lenses in the tube itself and a special eyepiece. The trench or field periscope of the First Great War



Periscope. Diagrams illustrating submarine, Fig. 1, and field, Fig. 2, periscopes. In each the image, entering at A, is reflected down by prism B to prism C, thence to eyepiece D. In submarine instrument: E is valve to shut out water if periscope is shot away; F, wheel to rotate instrument



Periscope. A naval officer at the eye-piece of a submarine periscope.

consisted simply of two mirrors fixed at the ends of a collapsible wooden or metal framework. See Submarine.

Peristalsis (Gr. *peri*, around; *stalsis*, compression). Rhythmic contractions which travel like waves along muscular fibres, exhibited only by involuntary muscles. Peristalsis of the intestine mixes the contents with the digestive juices and forces the material along the canal. The movement is worm-like, one set of muscles relaxing while another contracts. Heart movements are a more complicated form of peristalsis.

Peritoneum (Gr. *periteinein*, to stretch around). Serous membrane which lines the walls of the abdominal cavity and is reflected over the internal organs, so as to cover them more or less completely. The part lining the cavity is known as the parietal layer, and that covering the organs as the visceral layer. Folds of the peritoneum which are connected with the stomach are called omenta. The largest of these connects the stomach with the transverse colon, and is known as the greater omentum. The term mesentery is applied to any fold of the peritoneum which attaches the intestine to the posterior wall of the abdomen. Reflections of the peritoneum from the abdominal walls on to viscera other than the intestine are called ligaments.

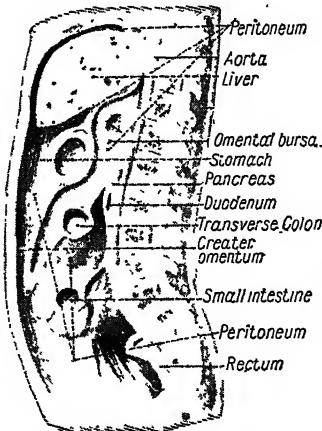
Peritonitis. Inflammation of the peritoneum. It results from injury of the membrane or extension of disease from one of the

abdominal organs. Hence it may arise from appendicitis, obstruction or ulceration of the bowel, strangulated hernia, cancer, etc. Often the infecting organism is the *Bacillus coli*, which is normally present in the intestine, and, when the walls of that canal are injured or diseased, is able to make its way through to the peritoneum. Tubercular peritonitis is another form common in children. Peritonitis may be general, affecting a large extent of the membrane, or local, i.e. limited to the neighbourhood of an inflamed organ, and it may be acute or chronic.

The symptoms of acute peritonitis are severe and continuous pain in the abdomen, often with a rise of temperature and vomiting. In acute untreated cases a fatal termination may occur within a few hours. Where perforation of the bowel is suspected, operative treatment is the best hope. Chronic localised peritonitis may be treated with penicillin and the sulpha group. See Abdomen.

Perivale. District of Middlesex, England. It lies S.E. of Greenford and N.W. of Ealing, and the river Brent, the Grand Union canal, Western Avenue, and rlys., both steam and electric, pass through it. Now comprising factories and residential blocks, its history goes back at least to Geoffrey de Mandeville, a 12th cent. lord of the manor. The tiny church is mainly E.E., 14th cent., but restored in 1875. It has a wooden western tower. Greenford Parva is an alternative name.

Periwig. Word derived from the French *perruque*, meaning an artificial head of hair. It is usually shortened to wig (q.v.).



Peritoneum. Diagram showing the general relation of the peritoneum to the adjacent organs

Periwinkle (*Littorina littorea*). Marine snail with thick calcareous shell. It is abundant on all parts of the British coasts, in the intertidal zone, whence thousands of tons are annually sent to inland towns for food. The mollusc has a distinct muzzle extended in front of a pair of tentacles or antennae, at the base of which are the eyes. Its principal food is marine algae, which is rasped by the efficient tooth ribbon. Periwinkles, or winkles, are found at low-water mark in all parts of the world.

Periwinkle (*Vinca minor*). Perennial herb of the family Apocynaceae. It is a native of Europe and W. Asia. It has



Periwinkle. Single flowers and glossy leaves of the Lesser Periwinkle, *Vinca minor*

tough trailing stems about 2 ft. long, which root from the base of the paired oval varnished leaves. The blue-purple, salver-shaped flowers are borne singly, chiefly on shorter erect stems. The style expands above into the broad stigma which almost closes the mouth of the tube. The greater periwinkle (*V. major*), familiar in gardens, is similar, but larger in all parts. It is a native of Europe and N. Africa. See Flower.

Periyar. River of Travancore, India. It rises in the Sivagiri Hills and flows N.W. and W. to the Arabian Sea. The upper waters of the Periyar have been diverted to the valley of the Vaigai for irrigation purposes. A dam, 176 ft. high, has made a reservoir of 8,000 acres, whence the water is led through a mile-long tunnel to the Suruli Valley and thence to the Vaigai.

Perizzites or **Pherezites** (perhaps villagers). One of the early peoples of Palestine. The name occurs in late insertions in the Hexateuch. They may have been Canaanite cultivators.

Perjury. Wilfully swearing falsely in a judicial proceeding after having taken a lawful oath, ad.

ministered by someone having authority to administer it, on a matter material to the issue. A mere slip of the tongue, or a hasty or exaggerated expression, will not amount to perjury. The statement need not be known to be false, if a person who knows nothing of the matter takes it upon himself to swear that it is true when it is not true. The matter sworn to must be, in some way, material to a point at issue—e.g. the actual subject matter of the trial, or the damages, or the credibility of the witness. Perjury is a misdemeanour, and so is subornation of perjury, i.e. procuring another to commit perjury. Both are punishable by fine and imprisonment. *See* Oath.

Perkin, Sir William Henry (1838–1907). British chemist. He was born in London, March 12, 1838, and educated at the City of London School and the Royal College of Chemistry. In 1856, while endeavouring to prepare quininesynthetically, he obtained a beautiful mauve dye or Perkin's purple, so founding the aniline dye industry. Perkin devised a process for making alizarin from anthracene, and produced several other aniline dyes. He was the first to prepare the perfume coumarin synthetically. He retired in 1873, the rest of his life being devoted to physical and chemical researches. Knighted in 1906, he received the Davy medal of the Royal Society, and died July 14, 1907. *See* Dyes; Greenford.

Perkins, Frances (b. 1882). American politician. Daughter of a Maine lawyer, she was born at Boston and educated at Mount Holyoke College, the university of Pennsylvania, and Columbia university. As chairman and afterwards industrial commissioner of the N.Y. industrial board, she made a reputation which led to her appointment in 1933 by F. D. Roosevelt as secretary of Labour. She thus became the first woman to enter an American cabinet. In that position, which she held until 1945, she took a leading part in carrying out the labour policies of the New Deal. In 1941 she was chairman of the I.L.O. conference in New York. She wrote several books on social problems, as well as *The Roosevelt I Knew* (1946). The wife of Paul Caldwell Wilson, an engineer and statistician, in her public work she always retained her maiden name.

Perlis. Northernmost state of the federation of Malaya, bounded by Siam to the E. and Kedah to the

S., with 25 m. of coastline on the bay of Bengal. Formerly one of the unfederated Malay States, it was acquired by Great Britain from Siam in 1909, and includes the island of Langkawi. Rubber, rice, tin, and coconuts are the chief products, and there are guano deposits. The W. line of the Singapore-Siam rly. passes through the state. Kangar, on the river Perlis, is the chief town. The area is 316 sq. m. Of a pop. est. in 1940 at 57,776, there are 46,133 Malays, 8,432 Chinese, and 1,178 Indians. Perlis fell without resistance to the Japanese in the Second Great War, being cut off by the advance into Kedah in 1941, and remained in Japanese occupation until Japan's surrender, Aug., 1945. *See* Malaya, Federation of.

Perlite. Igneous rock of perlitic structure. Glassy of texture, the rock easily breaks up into small rounded masses that have a pearly lustre and give it the alternative name of pearlstone. *See* Hyalite.

Perlitic Structure. In geology, name given to the presence in volcanic rocks of small concentric fissures or cracks. These cracks form planes of decomposition, breaking the rocks up into round fragments like pearls, which give the structure its name.

Perm. A Russian city. In the Sverdlovsk region of the R.S.F.S.R., it is the second largest town of the Urals and stands on the river Kama 240 m. by rly. N.W. of Sverdlovsk. Its prosperity is mainly due to copper mines discovered in the 17th century. There is also trade in silk and cotton goods, and in tea, leather, sugar, and fur. Koltchak captured Perm from the Bolsheviks in 1918. Pop. 255,196.

Permanganates. Salts of permanganic acid. The best known is potassium permanganate, a purple-coloured substance used in solution as a disinfecting agent, and also as an oxidising agent in analytical chemistry. In combination with sulphuric acid, potassium permanganate is used as a photographic reducer and as a bleach after first development of additive colour transparencies. The acid is unknown in the pure state, but exists as a crimson, strongly acid solution. Its chemical formula is KMnO_4 .

Permeability. The property of a solid which permits the passage of a fluid through it. Most solids are permeable, the degree of permeability varying from that given by spaces of molecular dimensions to that of large masses traversed by cracks. Filtration is a related phenomenon, since a filter is a

permeable substance. The permeability of rocks is of great importance, as it controls the rate of passage of fluids through the subterranean reservoir and is a major factor affecting the productivity of wells. The first detailed investigation was made by D'Arcy, 1856, who formulated an empirical law which bears his name. A unit of permeability used in petroleum reservoir studies is also named after him. In the laboratory determinations of permeability are made on samples recovered when drilling wells, but results are often misleading because they neglect the effect of large cracks and fissures.

In magnetism, permeability is the ratio of flux density to magnetising force. For air and non-magnetic substances it is unity; for magnetic substances it is not constant but varies with flux density. The metallic elements iron, nickel, and cobalt may have a permeability as high as 2,000, 300, and 250 respectively; special alloys attain values as high as 100,000.

Permian System. The geological period which comes after the Carboniferous and before the Triassic, i.e. at the end of the Palaeozoic era, about 200 million years ago. The name is derived from Perm in Russia, in which district Murchison studied rocks of this age. The period was characterised in Great Britain and Europe as one of desert conditions, inland drainage, and mountain building. The rocks are largely coarse sedimentary breccias, sandstones, marls, etc., of reddish colour due to staining by iron oxide. Limestones, dolomite, rock salt, gypsum, anhydrite, and potash salts also occur. In England red sandstones, etc., are the usual rocks of this period, but E. of the Pennines is an important group of magnesian limestones stretching from Durham to Nottingham. This group is water-bearing, and is also used as a building stone. Because of their normal colour and the fact that they overlie the coal measures, the Permian strata are sometimes called the New Red Sandstone.

In Europe the Permian has largely a twofold character and has in consequence been termed the Dyas. These two subdivisions are the Rothliegendes below, and the Zechstein above. In Germany there occurs near the base of the Zechstein a thin black shale which contains copper, locally in workable amounts, known as the Kupferschiefer. Above this are thick beds of rock salt, gypsum, and potash salts of great industrial

importance. Permian rock salt and gypsum also occur in the U.S.A. These deposits indicate evaporation of salt-water lakes or lagoons from which the various salts were precipitated. See Carboniferous System; Triassic System. Consult The Permo-Triassic Formations, R. L. Sherlock, 1948.

Permitted Explosives. Explosives used for blasting in Great Britain may be either permitted or non-permitted. Most commercial explosives made are used in mines under the Coal Mines Act, and more than 75 p.c. of these are of the permitted type. In British coal mines, only permitted explosives may be used where inflammable gas has been found within the previous three months in such a quantity as to be indicative of danger. The same restriction applies to dry and dusty seams. Permitted explosives in this sense are those prescribed by the board of Trade. The explosives must have passed certain tests to be placed (1) on the Home office list of "authorised explosives," implying that they are reasonably safe to manufacture, handle, transport, and use, and (2) on the board of Trade (mines department) list of permitted explosives, implying that they are reasonably safe against the possibility of ignition by fire damp or coal dust if used with due care. The authorised list is published annually. Other information is given in the annual report of H.M. inspectors of explosives, published by H.M. Stationery Office.

Tests are carried out at a research station at Buxton (hence Buxton test). The explosive is fired from a steel cannon into a cylindrical gallery 5 ft. in diam. containing a 9 p.c. methane air mixture in gas tests and coal dust in other tests. Five 8-oz. shots of the unstemmed explosive and five 28-oz. shots stemmed with a lag plug are fired into the gas mixture or coal dust and must not cause ignition.

SHEATHED PERMITTED EXPLOSIVES. In 1914 Lemaire introduced the sheathed explosive. The safety sheath consists of an annular ring of inert material surrounding the central core of explosive. Many different materials have been tried, but in the U.K. powdered sodium bicarbonate has been adopted. In 1938 bicarbonate felt was developed, which can be rolled around the cartridge of permitted explosive. Sheathed explosives now represent about 50 p.c. of the usage of permitted explosives. The safety sheath produces finely dis-

persed material which functions as a flame trap and prevents propagation of flame. See Explosives.

C. E. H. Bawn, Ph.D.

Permittivity. Alternative term for Specific Inductive Capacity (q.v.).

Permo-Carboniferous. In geology, term used for the borderline rocks of the Permian and Carboniferous series, and for the period of mountain building which occurred at that time. See Carboniferous System; Permian System.

Permutation. The act of changing one thing for another, or more literally, through another. Hence, the changing of the order in which things are arranged. In mathematics, the different arrangements of things. Thus three figures, taken two at a time, provide six different numbers of two digits each. Four dissimilar things can be arranged in $4 \times 3 \times 2 \times 1$ different ways, i.e. 24 permutations; for the first position can be filled by any of the four things; the second position, by any of the remaining three things; the third position, by either of the remaining two things; and each of these possibilities can be combined with each of the others. (The number $4 \times 3 \times 2 \times 1$ is called factorial 4, and may be written either $4!$ or $4\downarrow$). Thus, to generalise, n dissimilar things taken n at a time provide $n!$ permutations, or n dissimilar things taken r at a time provide $n(n-1)(n-2) \dots (n-r+1)$ per-

binations of b and c . Combinations are groups or selections of the same things, irrespective of the order in which they are arranged; thus six permutations provide only three combinations. The number of combinations of n dissimilar things taken r at a time can be calculated from the expression:

$${}^nC_r \times r! = {}^nP_r; \text{ that is, } {}^nC_r = {}^nP_r / r! = \frac{n(n-1)(n-2) \dots (n-r+1)}{1.2.3 \dots r}$$

Permutations and combinations are of importance and interest in the theory of probability, games of chance, football pools, statistical method, and algebraic work in connexion with series.

Pernambuco. Maritime state of N.E. Brazil. Situated S. of Parahyba and N. of Alagoas, it is well forested, fertile, and thickly peopled. There are plantations of cotton, sugar, coffee, cocoa, and rice; tobacco, cereals, and fruits are also cultivated. The chief exports include timber, dye-woods, drugs, rubber, and gold. The E. part of the state is served by rlys. The river São Francisco flows along part of the S. boundary, and many small rivers water the state. Its area is 49,560 sq. m. Pop. 2,674,683. *Prov. Pairnumbooko.*

Pernambuco OR RECIFE. Seaport and town of Brazil, capital of the state of Pernambuco. It stands on the Atlantic coast, 380 m. N.E. of Bahia, and is a terminus of rly. lines running to the N., S., and interior, besides being the nearest



Pernambuco, Brazil. Air view of the town and port, the capital of the state of Pernambuco

mutations. The number of permutations of n dissimilar things taken r at a time is commonly written nP_r .

The letters a, b, c , taken 2 at a time, provide 6 permutations ab, ba, ac, ca, bc, cb ; but it will be noticed that the first two permutations are combinations of a and b , the next two are combinations of a and c , and the last two are com-

S. American port to Europe. There is a regular bus service to Parahyba and a bi-weekly air service to Rio de Janeiro. The third city of importance in Brazil, it comprises three regions: (1) the old settlement of Recife, still the chief commercial centre, founded in 1504 and occupied by the Dutch 1630-54; it is situated on a sandy penin-

sula, and connected with the mainland by bridges: (2) São Antonio, on the island of São Antonio, formed by the rivers Biberibe and Capiberibe; (3) Boa Vista, on the mainland, the residential section. Pernambuco has some of the finest churches and public buildings in Brazil. Wide avenues and lofty modern buildings have replaced the narrow streets and one- or two-storey houses. The harbour is a port of call for numerous liners. It is a cable station, and there is a wireless station at Olinda, in the vicinity. Called the Venice of America on account of its many waterways, Pernambuco exports sugar, cotton, rum, coffee, cocoa, hides, rubber, and dye-woods. Pop. est. 350,000.

Pernov or **Pärnu**. Seaport of Estonia S.S.R. It stands on the bay of the same name, an arm of the Gulf of Riga, at the mouth of the Pernava. It is a rly. terminus and has connexions with Riga and Leningrad, also a trade in grain, flax, hemp, and leather. Founded in 1255, it became Russian in 1710. Pop. 21,000.

Perón, Juan Domingo (b. 1895). Argentine statesman. Born at Lobos, in the prov. of Buenos Aires, Oct. 11, 1895.



Juan Perón,
Argentine statesman

he studied at the national military college and was commissioned in the infantry. In 1930 he was appointed to the war ministry and the chair of military history at the staff school. Promoted lieutenant-col., he was in Chile as military and air attaché, 1937-38. During 1939-41 he visited Europe, studying mountain warfare with the Italian army.

Perón played a leading part in the revolution of 1943, and after a short period at the war ministry was made president of the national department of labour, which he reorganized. In 1944 he was made secretary for war and soon nominated as vice-president. Although he won popularity with the working classes some saw him as a possible dictator, and when a series of demonstrations was organized he resigned, Oct. 8, 1945, and was arrested. But the cabinet was reformed to exclude elements hostile to Perón, whose popularity was heightened by accusations brought by the U.S.A. that he had tolerated Nazi activities in Argentina.

A combination of the Labour party and the Radicals elected him to the presidency, Feb. 24, 1946, by a large majority. He was restored to the active list of the army as brig.-gen. He put in train far-reaching schemes of social reform. The extension of the franchise to women, which his wife Eva had long advocated, was enacted Sept., 1947. See Argentina in N.V.

Péronne. Town of France. In the dept. of Somme, it stands on the right bank of that river, 94 m. N.N.E. of Paris. The chief building is the church of S. Jean, dating from the 16th century, and there are the ruins of a castle. Péronne was formerly the capital of Santerre, and was afterwards in Vermandois. A fortified town, in 1465 it was surrendered to Charles the Bold, and it was in the castle here, described in Quentin Durward, that he kept Louis XI of France a prisoner. Wellington took Péronne in 1815, and in 1871 it was bombarded and entered by the Germans. They held it again during the First Great War from Sept. 24, 1914, until March 18, 1917, when they withdrew, causing immense damage; the Grande Place was wrecked, and the historic town hall reduced to ruins. The Germans recaptured Péronne on March 24, 1918, to be finally driven out by the Canadians on Sept. 1. In the Second Great War the town fell to the rapid advance of German armour on May 18, 1940. It was captured by the Allies in the autumn of 1944 against negligible resistance.

Perovskite. In mineralogy, name given to calcium titanate, CaTiO_3 . Pale yellow to brown in colour, with a metallic lustre, the mineral is found in metamorphic rocks and alkaline basalts.

Peroxide. Compound of oxygen with another element which contains a higher proportion of oxygen than the normal oxides. Examples include barium peroxide (BaO_2) and hydrogen peroxide (H_2O_2). The latter compound is the one frequently referred to as peroxide, and is a powerful oxidising and disinfecting agent used in dilute solution for bleaching the hair. See Hydrogen Peroxide.

Perpendicular (Lat. *perpendiculum*, a plummet). Term used for something exactly upright. In geometry, it is used to indicate a line which is at right angles to a given line or surface.

In architecture, the Perpendicular period refers to the phase of Gothic architecture which began

towards the end of the 14th century and lasted till the Renaissance, about 1560. It was peculiar to England, and its principal characteristic was verticality. Even the window tracery consisted of vertical members, the mullions being carried straight up through the head of the window, which was in its turn much larger than its predecessors of the Decorated or Early English styles. Arches had two arcs or four, the latter type being known as four-centred; columns were composite or clustered, with small capitals, generally moulded; roofs were of the hammer beam type, at first heavier than before. The Perpendicular period witnessed a great increase in the use of panelling, an enhanced richness in the decoration of the choir-stall, and the perfection of fan tracery vaulting.

The western part of the nave of Westminster Abbey is Perpendicular architecture at its best; one may cite also Henry VII's chapel at Westminster, S. George's chapel, Windsor, and the choir of Gloucester cathedral. The period produced fine domestic buildings. See Arch; Architecture; Bath; Gothic Architecture; Ilminster illus.

Perpetual Motion. Action of an imaginary machine which, once set in motion, continues for ever without further impetus, unless stopped by some external force. Such a machine is inconceivable, since by the law of the conservation of energy it is not possible to do work without the expenditure of energy in some form. Many attempts have been made to produce perpetual motion machines, but none has been successful. Those which have apparently succeeded have depended upon the forces of nature, e.g. a water wheel at Niagara. See Energy; Motion.

Perpetuating Testimony. Term used in English law. Any person who has a contingent right or claim to any honour, title, office, or real or personal property, which right or claim will arise only in the future, may bring an action to take the evidence of persons who are able to testify to the truth of his right or claim, and who might, and probably would, be dead before the event happened, or the time arrived when the claim would mature. Similarly, when a witness in a criminal case is dangerously ill, his evidence may be taken by a magistrate (e.g. in hospital) in the presence of the accused, and if the witness dies his deposition may be read at the trial.

Perpetuity. Legal term for a condition rendering an estate inalienable for ever, or for a very long time. This is especially repugnant to English law, which will not allow a man so to settle, or leave by will, his property as to tie it up for ever. Property can be tied up in this way only during a life or lives in being, and for 21 years after. The rule against perpetuities was established long ago by the judges on public grounds, as destructive to the commonwealth and an impediment to commerce. See Entail; Thellusson, Peter.

Perpignan. Town of France. The capital of the dept. of the Pyrénées-Orientales, it stands on the right bank of the Têt, about 40 m. S. of Narbonne. On a height overlooking the town is the citadel which encloses the old castle of the counts of Roussillon. The most important buildings are the cathedral of S. Jean, founded by Sancho II, king of Majorca, 1324; the loge, now occupied by the Mairie; and the old university, containing a public library and a museum. Trade is carried on in wine, wool, cloth, and cork-bark. In the Middle Ages Perpignan was the capital of the county of Roussillon, and belonged to Aragon from 1172 to 1475. The French conquered it in 1642. It was permanently united to France in 1659. Pop. 74,984.

Perranporth. Town of Cornwall, England. It is about 8 m. N.W. of Truro on Perran Bay, famous for its sands and cliff-scenery. The town owes its name to S. Piran, one of S. Patrick's missionaries. At Perranzabuloe, 2 m. S.E., is the church of S. Piran, the remains of which comprise a stone oratory, uncovered in 1835 after being buried by the sand for centuries. It was built by Celtic missionaries who deposited in the oratory the remains of the saint. S. Piran's Round, 1½ m. E., is a vast arena where miracle plays were performed in medieval times.

Perrault, CHARLES (1628-1703). French author. Born in Paris, Jan. 12, 1628, and educated at the Collège de Beauvais, he

followed his father's profession, the law, became secretary to Colbert, and signalled his admission to the Academy in 1671 by a long poem, *Le Siècle de Louis XIV*, which pre-

cipitated a six years' dispute with Boileau on the respective merits of the ancients and the moderns. He wrote memoirs and other works, but his fame rests on a series of fairy tales, which he made his own by the delightful style in which they were written. They include *Puss in Boots*, *Little Red Riding Hood*, *Cinderella*, *The Sleeping Beauty*, etc. Issued in volume form, 1697, as *Histoires ou Contes du Temps Passé*, by Perron Darmancon, they achieved immense popularity and had many imitators. Perrault died May 16, 1703. In 1910 the French government erected to his memory, in the Jardin des Tuileries, Paris, a monument by G. Pech. *Pron.* Perro.

Perrier. Mineral spring of France. Near the village of Vergèze, in the dept. of Gard, it is 10 m. from Nîmes. The spring was discovered by the Romans, and a Roman well is still in existence.

Perrin, JEAN (1870-1942). French physicist. Born in Lille, Sept. 30, 1870, and educated at the École Normale in Paris, he became a reader in physical chemistry at the Paris university, and in 1910 professor of sciences there. He wrote on the molecular phenomena of oscillation and the Brownian movement in kinetics. Admitted to the academy of sciences in 1923, he won the Nobel prize for physics in 1926 for work on the discontinuity of the structure of matter and his discovery of the equilibrium of sedimentation. In 1938 he announced the existence of transuranium, an element with an atomic weight greater than that of uranium. Perrin was an active politician of the Left; in 1936 Léon Blum made him under-secretary for scientific research, and in 1939 he was president of a committee for scientific research. In 1941 he went to the U.S.A., where he worked for the Free French, and died April 17, 1942.

Perrot, GEORGES (1832-1914). French archaeologist. Born at Villeneuve St. Georges, Seine-et-Oise, Nov. 12, 1832, he studied in Paris. He proceeded to Athens in 1855, and in 1861, in company with the architect E. Guillaume, made archaeological explorations in Asia Minor, including Ançyra and several Galatian and Hittite sites. He occupied a chair of classical archaeology in Paris, 1875, and in 1904 became perpetual secretary to the Academy of Inscriptions. His outstanding work, written with the architect C. Chipiez, is a *History of Art in Antiquity*, 10 vols., 1882-1914. He died June 30, 1914.

Perrot, SIR JOHN (c. 1527-92). English courtier. Born in Pembroke-shire, the supposed natural son of Henry VIII, he came to London in his 18th year, and attracted the attention of the king, who promised him preferment. After the death of Henry, he was made a knight of the Bath by Edward VI, and accompanied a mission to France to arrange the young king's marriage. Under Mary, Perrot was imprisoned for his religious views, but, reinstated by Elizabeth, he became first president of Munster in 1570. There he quickly suppressed the rebellion of Fitzmaurice Fitzgerald, returning to England, 1573, to defend himself against home enemies. He was lord deputy of Ireland 1584-88. Tried for treason, he received the death sentence, June 26, 1592, but died in the Tower in Sept.



Sir John Perrot, English courtier

Perry (Old Fr. *peré*, from Lat. *pirum*, a pear). Alcoholic liquor obtained from fermented pear-juice. It is largely made in France, especially in Normandy and Brittany, and in England, in the counties of Worcester, Gloucester, Hereford, Devon, and Somerset. Made in a similar way to cider (*q.v.*), it is a fine, pale-coloured, sweet and aromatic beverage, containing 5 to 9 p.c. of alcohol.

Perry, FREDERICK JOHN (b. 1909). English lawn tennis player. Born at Stockport, May 18, 1909, he went to school at Ealing. By 1929 he was world champion at table tennis. Turning to lawn tennis, he played from 1931 in the British Davis Cup team and won the



F. J. Perry, English lawn tennis player

American singles and French doubles in 1933. In 1934 he was the first Englishman to succeed in the Wimbledon singles since 1909, beating the holder, Jack Crawford. The next two years he beat G. von Cramm in the final. Perry was champion of the U.S.A. in 1934 and of France in 1935. He became a professional in 1937. He was renowned for a forehand drive, especially in return of service. Perry wrote *My Story*, 1934; mar-



Charles Perrault, French author

ried the American actress Helen Vinson; and became an American citizen in 1940.

Persano, CARLO DI PELLION (1806-83). Italian sailor. Born at Vercelli, March 11, 1806, he entered the Piedmontese navy and rapidly rose to flag rank. He distinguished himself at the sieges of Messina, Gaeta, and Ancona, 1860-61, and in 1862 became minister of marine. In supreme naval command in the war against Austria, 1866, he was defeated at the battle of Lissa, and although not solely to blame for the disaster, was made the scapegoat and degraded. He died July 28, 1883.

Perseid Meteors. Shower of meteors, which have their radiant point in the constellation of Perseus. The shower appears in August and lasts two to three weeks. It was first recorded in the 6th century. The shower follows the same path as Tuttle's comet, (*q.v.*) and has been calculated to have a width of 30,000,000 m.

Persephonē or PROSERPINE. In Greek mythology, daughter of Zeus and Demeter, the goddess of agriculture. She was carried off while gathering flowers by Pluto, the god of the underworld. The story of Demeter's search for her lost daughter is told under the entry Demeter. Persephonē was allowed to spend six months of the year in the underworld, and six months with her mother. The rape of Persephonē is symbolical of the process of agriculture, her abduction to the underworld representing the sowing of the seed, and her return to her mother the growth of the corn. As the wife of Pluto, Persephonē was queen of Hades. The Garden of Proserpine is a well-known poem by Swinburne. *See* Demeter. *Prom.* Per-seffonee.

Persepolis (Gr., city of the Persians). Capital of the ancient Persian empire after Pasargadae. It was situated in the valley of the Medus or Murghab, near the Carmanian desert, 35 m. N.E. of the modern Shiraz. The vast ruins attest the magnificence of its architecture. The palaces and other public buildings are built on a terrace of masonry some miles from the city proper, and were approached by splendid stairways. The great hall alone covered 2½ acres. Persepolis was founded, according to some accounts, by Cyrus the Great, according to others by Cambyse. It was taken by Alexander the Great in 331 B.C., and the story goes that the burning of the palace of Xerxes was the act of Alexander himself, who in a

drunken frolic, instigated by the courtesan Thais, applied the fire with his own hand. This is referred to in Dryden's *Alexander's Feast*. *See* Persia.

Perse School. English public school. Its foundation dates from 1615, under the terms of the will of Stephen Perse (1548-1615), of Cambridge, which provided, among other objects, for the building of a free grammar school for the benefit of the town of Cambridge. It was erected soon after his death in what was then known as Free School Lane, behind Corpus Christi College. About 1842 new buildings were erected, and in 1873 a school for girls was established under the Perse foundation. In 1890 the school was removed to a more convenient site on the Hills Road, the old site and buildings being purchased by the university. Part of the original structure is still preserved. The buildings and grounds have often been enlarged. A notable headmaster was W. H. D. Rouse, 1902-28.

Perseus. In Greek legend, son of Zeus and Danaë, daughter of Acrisius, king of Argos. Polydectes, king of Seriphus, wishing to marry Danaë, was desirous of getting rid of Perseus, and sent him to Libya to secure the head of Medusa, the Gorgon. With the help of Athena, Perseus succeeded in his task, and on his return journey passed through Ethiopia, where he saved Andromeda (*q.v.*) from the sea-monster, and made her his wife. Reaching Seriphus, and finding that Polydectes had been treating his mother unkindly, he turned the king and his whole court into stone by showing them the Gorgon's head. He subsequently presented the head to Athena.

Perseus now returned to his original home at Argos, to see his grandfather, Acrisius, taking with him Danaë and Andromeda. At Larissa he accidentally killed Acrisius, as an oracle had foretold, with a quoit. Perseus became king of Argos, and subsequently exchanged it for Tiryns; he is also regarded as the founder of Mycenae. *See* Cellini, B.; Gorgon.

Perseus. In astronomy, a N. constellation extending from Cassiopeia to Taurus. It is traversed by the Milky Way, and contains the eclipsing variable star Algol or Beta Persei. The constellation also contains a number of other variables and many double stars. On Feb. 22, 1901, a new star suddenly appeared in the constellation (*see* Nova), and remained visible for nearly four months. Perseus is

notable for two fine star clusters, N.G.C. 1039 and h Persei.

Perseverance. Term used in Christian theology to denote the persistency of the Christian life in the believer. The doctrine of the final perseverance of the saints is one of the characteristic features of the theological systems of S. Augustine and Calvin. It is impossible, according to this principle, for the true Christian ever to relapse from the faith. According to the teaching of Calvin, as formulated by the synod of Dort, "of this preservation of the elect to salvation and of their perseverance in the faith, true believers do and may obtain assurance whereby they arrive at the certain persuasion that they ever will continue true and living members of the Church."

This belief is the natural corollary of the doctrine of predestination, as set forth by Calvin. If the Christian is a man who has been predestined by God to eternal life, then it is, of course, impossible for him to lose his predestined reward. The doctrine of final perseverance was rejected by the Arminians. John Wesley wrote a tract in which he sought to prove that this belief was not in accord with the teaching of Scripture. He shows that Hebrews 6, vv. 4-6, definitely points the possibility of relapse, as also does 2 Peter 2, vv. 20-21, and that other N.T. passages only promise conditional security, e.g. John 15, vv. 1-6, Romans 11, vv. 20-22. *See* Calvinism; Grace.

Pershing, JOHN JOSEPH (1860-1948). U.S. soldier. Of Alsatian descent, he was born in Mis-



Gen. Pershing,
American soldier

souri, Sept. 13, 1860. Graduating from West Point in 1886, he became a 2nd lt. in the 6th cavalry regt., and served against the Apache and Sioux Indians during the next three years. Appointed instructor in tactics at West Point in 1897, he resigned in 1898 to take part in the Spanish-American war. After a period at the war dept. he was sent to the Philippines, and with the rank of gen. commanded the expedition against the Moros of Mindanao in 1902. As military attaché at Tokyo, he was in Manchuria with Kuroki's army during the Russo-Japanese war in 1905. After further service in the Philippines he was given command of

the El Paso patrol on the Mexican border; his wife and three daughters lost their lives in the burning of the Presidis, Aug. 27, 1915. He later led the expedition sent in pursuit of Villa in 1916. On May 18, 1917, he was named c.-in.-c. of the American Expeditionary Force with the rank of lt.-gen., arriving in France in June. He was awarded the G.C.B., 1918. In 1919 he received the freedom of the City of London. Promoted gen. in that year, he became chief of the staff two years later. In 1924 he retired, and on Oct. 17 laid the congressional medal of honour on the grave of the unknown warrior at

Westminster. Dying July 15, 1948, he was buried in the Arlington national cemetery. He wrote *My Experiences in the World War, 1931*.

Pershore. Market tn. of Worcs, England, on the Avon, 8 m. by rly. S.E. of Worcester. The chief building is the abbey church of the Holy Cross, with a fine tower and an Early English choir. Pershore is in the plum country. Vegetables are also grown. Other industries are the manufacture of agricultural machinery and jam. Cattle and horse fairs are held. An abbey was founded here about 690. At one time the town sent two members to parliament. Pop. 3,443.

and turquoise in Khorassan, and rock salt near the gulf are known, but have been but little exploited. The country is rich in oil, which is worked by foreign companies, the chief of which is the Anglo-Iranian. The chief exports are petroleum, carpets, opium, raw cotton, fruit, animals, rice, and wool.

Cotton goods, sugar, tea, and vehicles form the bulk of the imports. Most of the trade is with the British Empire, Egypt, and Russia.

Apart from a number of old trade routes, such as Enzeli-Teheran, Kasvin-Hamadan-Chanikin, Shiraz-Ispahan-Sultanaabad, Kerman-Meshed and Kerman-Yezd-Teheran, there is the Trans-Persian rly., completed in 1938, linking the Persian gulf with the main oilfields at Dizful-Shushtar, Burujird, Teheran, and the S.E. bight of the Caspian sea. It is planned to link it with the Julfa-Tabriz rly., which is Persia's only other rly. apart from short local lines at Resht and Bushire. Shipping to the extent of about 10 million tons in the gulf and 600,000 tons in the Caspian uses Persian ports.

GOVERNMENT. Persia is divided into 10 provinces, Ustans, under governors-general, with 76 districts, Shahristans, under governors. The 1906 constitution provided for a parliament, Majlis, comprising a national assembly and a senate. Amendments in 1949 empowered the shah to dissolve the Majlis and hold fresh elections, and to amend the constitution without summoning an assembly. Electoral franchise is granted to all males over 20, but those elected must be between 30 and 70. All foreign trade is a state monopoly. The currency is the rial, worth about 130 to the £. Nearly two-thirds of Persia's export results from the activity of the Anglo-Iranian Oil Co. (*q.v.*) Imports, in 1945-46, were 3,000 million rials, exports 1,700 million.

The standing army is 90,000 strong, relatively well equipped; there is an air force of 180 aircraft, mainly British, and a U.S. military mission in Teheran. Naval forces consist of small coastal vessels.

HISTORY. The first inhabitants of the country in historical times appear to have been of Sumerian stock, but at a later date an Aryan race descended upon Iran, who, in the course of time, conquered the aborigines and laid the foundation of an Aryan kingdom. On the fall of the Assyrian Empire this Aryan people, known as the Medes, became the heirs of its political power, and to a great extent

PERSIA: IN ANCIENT & MODERN TIMES

Various Contributors

Further information will be found in the articles on the cities, e.g. Teheran, the mountain ranges, and other physical features of Persia. See the biographies of Cyrus and other rulers; also Alexander the Great; Shites; Sufism; Xerxes; Zend-Avesta; Zoroastrianism

Persia (Persian, *Iran*), is today a constitutional monarchy with a democratic parl. govt. Its area is 628,000 sq. m., mainly of high table-land of 3,000-5,000 ft., bordered by huge mountain ranges, of which the highest peak, the Demavend, in the N.W., reaches



Persian arms

18,700 ft. Large parts of the interior consist of deserts (*desht*), of which the great salt Desht-i-Kevir alone covers about 45,000 sq. m., and the sand wastes of Desht-i-Lut in the S.E. and similar stretches at least as much. Of the few rivers, the Karun in the W. is the only one navigable. The population is est. at between 12 and 16 million, but exact figures are unobtainable as a large part of the pop. consists of nomadic tribes.

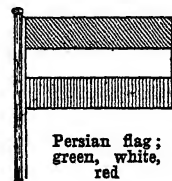
Three-quarters of the people are Shia Mahomedans, one-tenth as many adhere to the Sunni sect, the rest are Jews, Armenians, and Nestorians.

Most of the level country in Persia is comprised in the two great provinces of Kerman and Khorassan. The main cities are the capital Teheran (pop. 700,000), Tabriz (215,000), Ispahan (205,000), Meshed (180,000), Shiraz (130,000), Resht (125,000), and Hamadan (100,000).

The climate generally prevailing is one of great aridity combined with excessive heat, although on some of the uplands extreme cold prevails. At Teheran in the N.

(4,000 ft.) the mean temp., on the average, varies from 34° F. in Jan. to 85° F. in July; at Jask, on the gulf of Oman, from 67° F. to 90° F. Between the mountain ranges and the Caspian there is an abundance of rainfall. The Persian gulf seaboard, however, is sultry and unhealthy.

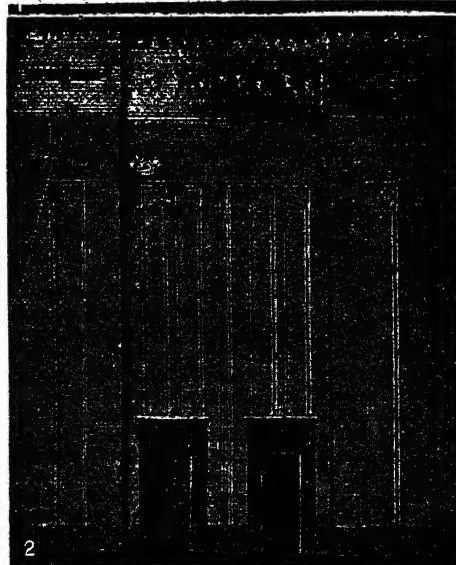
Because of the general aridity, trees and large shrubs are infrequent, except on the rainyslopes adjacent to the border seas. Date palm cultivation flourishes along the shores of the Persian gulf; cedars, oaks, beech, and box grow extensively on the N. slopes of the Elburz range. Food products include the cereals wheat, barley, and millet, and milk, which is usually taken curdled or fermented, but rarely pure. The lowlands yield wool, silk, cotton, olives, opium, and tobacco, the trade in the last two being so profitable that ground needed for foodstuffs is given to these crops. The higher ground is



Persian flag; green, white, red

pastoral country, from whose sheep and goats is gained the wool for the celebrated carpets.

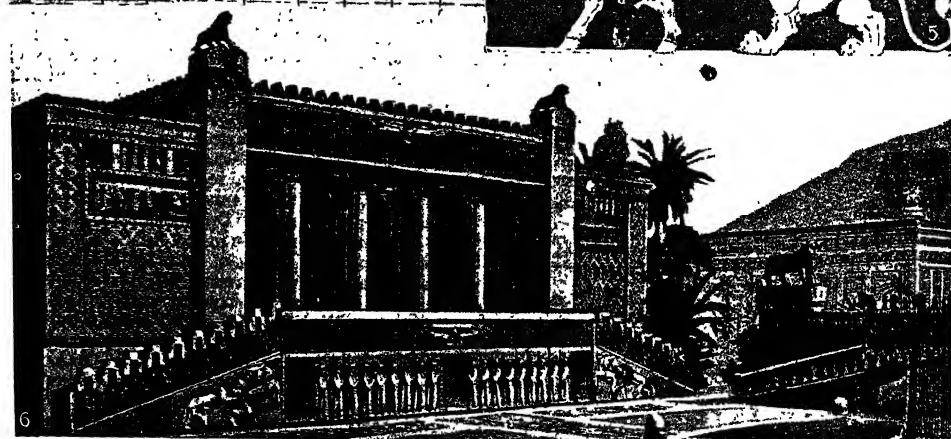
In the N., lions, leopards, jackals, and cheetah are hunted; the bustard is found almost everywhere. There are pearl fisheries in the Persian gulf. Mules, camels, and small horses are reared. Deposits of coal and iron in the Elburz, copper, lead, and other metallic ores in Kerman, copper



2

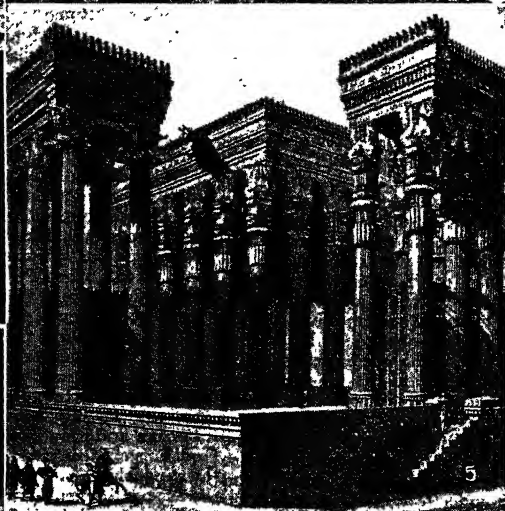
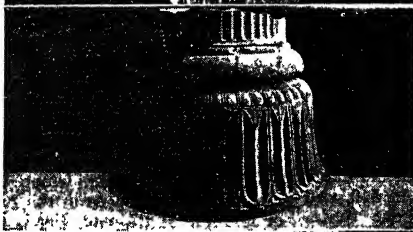
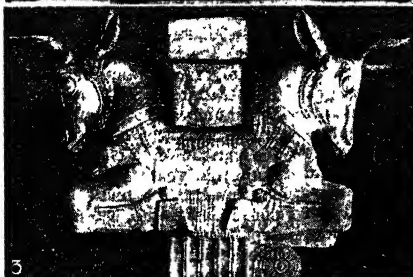


5



1. Reconstruction, in the Louvre, Paris, of the palace of Darius at Susa. 2. Pavilion of the throne room of Darius, Susa. 3. Frieze in enamelled tiles representing archers, palace of Darius, Susa. 4. Frieze in enamelled tiles, Susa. 5. Tile depicting a lion rending a unicorn, Persepolis. 6. Reconstruction by C. Chipiez of the palace of Darius, Persepolis

PERSIA: ART AND ARCHITECTURE OF OLD-WORLD SUSA AND PERSEPOLIS



1. Chamberlain introducing tribute bearers, from a relief at Persepolis. 2. Fire altars near Naqshi Ristan, relics of ancient Persian nature worship. 3. Capital and, 4, base, of column from the palace of Artaxerxes

Mnemon at Persepolis. 5. Reconstruction by C. Chipiez of the hypostyle hall in the palace of Xerxes, Persepolis. 6. Reconstruction by C. Chipiez of the terrace of palaces at Persepolis

PERSIA: REMAINS AND RECONSTRUCTIONS OF ITS ANCIENT ARCHITECTURE

of its civilization. Media became a powerful empire under Cyaxares (d. 584 B.C.), who overthrew both the Assyrians and the Scythians. When he came to the throne the paramount power of the East was Semitic, but he left it Aryan. His son, Astyages, was attacked by an army of Persians under Cyrus, and in 550 the empire of Media passed into the hands of the kindred Aryan people of Persia.

Decline of the Empire

After conquering Croesus, king of Lydia, and overthrowing Babylon, Cyrus was assassinated by Tomyris, queen of the Massagetae. Cambyses, his eldest son, succeeded him in B.C. 529. He invaded Egypt, which he brought under tribute, but his mind became unhinged and he destroyed himself. Darius, a usurper, attacked and reduced the Greek cities of Thrace and Macedonia and refounded the Persian Empire on a more solid basis. Xerxes in 481 launched a great attack upon Athens, but received a check through the defence of Thermopylae by the Spartans. He won a naval engagement at Artemisium, after which he succeeded in taking Athens, but he was badly beaten in a sea-fight off Salamis and retreated in great disorder to Persia. Artaxerxes and Cyrus the Younger saw the beginning of the decline of the Persian Empire. The rise of Macedonia under Philip and Alexander brought about the temporary fall of Persia. Persepolis and Pasargadae were occupied in 330, and the victorious Macedonian tide swept E., Hellenising a very large portion of Central Asia.

At the death of Alexander, his empire almost at once fell into dismemberment, and what is now Persia was ruled by the dynasty of the Seleucids, descendants of one of the generals of Alexander. The Parthians, a Turanian tribe from the N., whose home lay within the modern provinces of Khorassan and Astrabad, produced the Arsacid dynasty, about 249 B.C., who gradually seized the whole of Persian soil, but it was menaced by the surrounding barbarians. It had, however, relations with China and Rome on either side, and the latter power invaded it in 53 B.C. Successive Roman generals invaded Parthia, and after long-continued fighting, in which victory inclined, now to one, now to the other side, a truce was observed.

The Parthian power gradually declined, and its place was taken by the Sassanian dynasty, which marked a new and splendid epoch in Persian history. Under its sway, Iran recovered its independence

instead of constituting one of the provinces ruled by a Parthian king. Once its king, Ardashir, had fully established his power, he threw down the gauntlet to the Romans, and inflicted a heavy defeat upon them. He was also instrumental in reviving the Zoroastrian religion, with its picturesque rites of fire-worship. His successor, Shapur, defeated the Romans on several occasions, and in A.D. 260 captured Valerian, the Roman emperor. He was, however, beaten by Odenathus of Palmyra, whose country became a buffer state between Persia and Rome.

The Sassanian dynasty included a number of brilliant kings, of whom Shapur the Great (310-381) who also carried on war with Rome, is the most notable. His successors had a long and arduous struggle with the White Huns, Bahram (d. 448), mentioned by Omar Khayyām as a great hunter, defeating them with tremendous loss, as did his descendant Firuz, who, however, was finally worsted by them in A.D. 483, when Persia fell under their dominion. The Sassanian dynasty, however, ultimately succeeded in crushing the White Huns in 523. During the period of this dynasty commercial and artistic relations were founded with China, to the lasting benefit of both Persian and Chinese art. With the coming of Noshirwan in 531 peace was concluded with Byzantium, but was soon broken by that monarch, who captured Antioch in 540, and spread terror throughout Syria, extorting an enormous indemnity.

Coming of the Turks

In this reign we first hear of the coming of the Turks from Central Asia. Noshirwan committed the folly of poisoning certain Turkish envoys, whereupon their countrymen invaded Persia. They were, however, easily repulsed. Once more Byzantium made war upon the Persian monarch, who surprised the invaders by night, and inflicted a crushing defeat upon them. Hormazd, son of Noshirwan by the daughter of the Khan of the Turks, exhibited tyrannical tendencies and entangled himself in war with Byzantines. His Turkish kinsmen took advantage of this, and invaded his realm, but were badly beaten, 588, and lost an enormous booty. Tired of the irregularities of Hormazd, his nobles conspired against him, and he was assassinated.

His son, Chosroes II (*q.v.*) was beaten in the field by his late father's enemies, but in 591 was restored by a Byzantine army. Taking advantage of the confusion in the Byzantine empire, he invaded Syria

in 611, sacked Antioch, and took Damascus, Jerusalem, and Alexandria. In 623, however, Armenia, then a dependency of Persia, was invaded by Heraclius, and Chosroes was taken by surprise. He fled, and was never afterwards able to rally. Finally he was taken prisoner, and put to a lingering death. The most magnificent of the Persian monarchs, he had no capacity for administration, and was scarcely a match for the brilliant Heraclius.

Arab Conquests

The Persian empire, worn out by the long struggle with Byzantium, and with only a boy as heir to the throne, was nearing its end. During a period of anarchy, in 633 the Arab leader Khalid led a Beduin army against Iran, defeated the Persian forces, but retired later. The Arabs returned, however, under Mothanna, and Yezdigird, the last of his line, was entirely broken at the battle of Nehavend in 642. For some years Persian resistance continued, but finally the Arabs poured into Iran, which became a dependency of the Ommyad Turks. These conditions obtained until 749, when a revulsion against Arab methods and language set in.

The Abbasides, a rival family to the Ommyads, conspired against the latter, and massacred many of their adherents. The Abbasides found their strongest adherents in Persia, but still rebellion broke out from time to time. During the Golden Age of Islam, which perhaps found its apogee in the reign of Haroun Al Raschid, Persia was still entirely under the regime of the Caliphate, but national feeling had never become extinguished, and the Zoroastrian religion continued to be practised in secret. But the Seljuk Turks had now occupied Transoxiana, and thus threatened the Arabian empire. Finally, they prevailed, and in 1037 founded a dynasty.

The Crusades affected the fortunes of Persia only indirectly, but undoubtedly Persia, as a great repository of art, science, and mysticism, exercised, like Byzantium, much influence upon the European invaders, whose dress, horse-equipment, miniature painting, art of design, tapestries and mode of thought were all directly influenced by Persian models.

The picture of Persian history grows darker during the devastating invasion of the Mongols, who swept over W. Asia and Europe like a destroying wind. Invading Turkistan in 1218, they advanced to Transoxiana under Jenghiz Khan, and onward to Merv and Khorassan, which they speedily overran. They devastated W. and

N.W. Persia, nearly exterminating the population. Later on the Caliphate was extinguished, and Persia became a Mongol principality under Mangu in 1251.

This inaugurated what is known as the reign of the Il-Khans of Persia. Its greatest monarch was Ghazan Khan (1295), who conducted campaigns in Syria and S. Persia, and had intimate relations with Byzantium and the W. powers. This condition of affairs lasted until the coming of Tamerlane, who, as governor of Mongolia, observed the state of anarchy into which Transoxiana had fallen and determined to annex it. He fitted out an expedition for this purpose in 1360, overran Persia and Mesopotamia, as well as a large part of India, and from his fourth son, Shah Rukh, sprang the line of the Timurid dynasty of Persia, which, at first virile and devoted to the arts, ended in a series of *rois fainéants*. This state of affairs was relieved by the appearance of Babar, who, after vindicating his right to the throne as a boy, seized also upon Kabul in 1504, and carried out several expeditions into India, a feat of arms which resulted in the founding of the dynasty of the Moguls.

First English Embassy

The Safavi dynasty arose towards the end of the 15th century. Ismail, its founder, was a popular favourite in Persia because of his partiality to the Shia doctrine. He annihilated the last of the Timurids, drove the Uzbeks out of Khorassan and Merv, and expelled an invasion of the Turks under Selim the Grim. In 1534, during the reign of Tahmasp, Persia was once more invaded by the Turks under Solymun the Magnificent, but the results of the campaign were indecisive, and a peace treaty was concluded in 1555. This reign is marked by the first English embassy to Persia under Anthony Jenkinson.

Then followed the spacious times of Shah Abbas I (*g.v.*), the Great, grandson of Tahmasp. Nominally governor of Khorassan, and as a child a puppet in the hands of his advisers, he succeeded in gaining the Persian throne, and was soon afterwards menaced by a Turkish invasion. He made peace with the Turks, however, to concentrate against the Uzbeks. Reorganizing his army, he carried out several successful campaigns against Turkey during 1602-27.

The rounding of the Cape of Good Hope opened up the East by sea, and in 1507 the Portuguese sent an expedition against the port



Persia. Map of the country, showing its important strategic position in relation to the Persian Gulf, the Middle East, and the U.S.S.R.

of Hormuz, the modern Bandar Abbas, where they established themselves in 1515. England began to trade with Persia by sea in 1614, her chief quest being for silk. The English assisted the Persians to clear the Portuguese out of Hormuz. Towards the middle of the 17th century the Dutch began to open up trade at Isfahan and were followed by the French, who, like other Europeans, regarded Persia as a regular mine of wealth to be exploited. The Safavi dynasty now began to decline. The Uzbeks and Turks were once more troublesome, and the first Russian embassy to Persia in 1664 boded little good for the future.

The rise of the war-like Afghan race in the hill-country to the N.E. had for some time been a source of uneasiness to the Persian rulers who had been attacked by them. Kandahar was then a Persian province which had as its governor Gurgin Khan. But he was deposed by a conspiracy of Mirvais, an Afghan chief, who, falling upon the Persian troops who occupied Kandahar, put them to the sword. Out of these circumstances arose the independence of Afghanistan, which newly consolidated power began to make raids into Persia, conquering it, and overthrowing the Safavi dynasty, 1722. Later, however, it was expelled by Shah

Mahmud. In 1724 W. Persia was overrun by the Turks. They were defeated in 1726 by Ashraf, who also routed the Afghans in 1730.

In 1736 Nadir Kuli, a great soldier, was crowned shah of Persia. He did more than any of his predecessors to consolidate the Persian power. On his assassination he was succeeded by Ali Kuli, first king of the short-lived Zand dynasty. Aga Mohammed Khan founded the Kajar dynasty, 1794, and beat back more than one Russian invasion. He was followed by descendants of the same family for 120 years. In 1801 Russia annexed Georgia. Disastrous campaigns followed which ended in the treaty of Turkmanchai in 1828, whereby Persia lost Armenia to Russia. From 1830 to 1860 Persia made every effort to recover provinces in Afghanistan to balance her losses to Russia.

These campaigns were viewed with apprehension by the princes of India, who foresaw that if Persia were successful, she would merely make a road for Russia to the country S. of the Hindu Kush. They therefore addressed themselves to the task of keeping Afghanistan outside the spheres of influence of both Russia and Persia. This led to misunderstandings between Great Britain and Persia, and to the Anglo-Afghan alliance

of 1855. Reluctantly Great Britain declared war against Persia in 1856, and peace was concluded in the following year, the shah agreeing to recognize the independence of Afghanistan.

Russia now began to advance in Central Asia with giant strides. In 1849 she had occupied the valley of the Syr Daria, in 1867 she annexed the khanate of Kokhand, and by 1873 had conquered Khiva. In 1881 the Turcomans were crushed by Skobelev at Geok Tepe. This state of affairs was not improved by the question of the boundary of Seistan which arose between Persia and Afghanistan in 1863, and which was not settled until 1872.

"Spheres of Interest"

Rivalry between Russia and the U.K. for influence in Persia, in which a Russo-Persian loan treaty of 1900 gave Russia a great start, led to an Anglo-Russian treaty of 1903 guaranteeing Persia's integrity. After Shah Muzaffer-ed-Din (1896-1907) had been forced by public unrest to grant a constitution and parliament, 1905-06, in 1907 Russia and the U.K., in another treaty, split Persia into two "spheres of interest," Russian in the N., British in the S., with a small independent strip between. Shah Mohammed Ali (1907-09), having dissolved parliament after a bombing attempt had been made upon his life in Feb., 1908, was dethroned, and succeeded by his 11-year-old son Ahmed Mirza (1909-25).

Though officially neutral during the First Great War, Turkish-German infiltration and leadership in tribal warfare led to a Russian and British occupation of their respective spheres of interest, and to fighting, in which the German consul and Sir Percy Sykes (*q.v.*), also the Shah's detention by Russian forces, played a part. After the war the Soviet government spontaneously annulled the 1907 treaty and gave Persia a free hand; a new treaty with the U.K. failed to win the Majlis's consent, and British forces were withdrawn.

Ahmed Shah, last of the Kajar dynasty, had become a mere puppet when, in 1921, Reza Khan, originally a private of the N. Persian brigade of kosacks, acquired the command as minister of war, and later supreme power as premier-dictator. Ahmed Shah left for France, where he died in 1930. After first trying to establish a republic and creating a small but up-to-date military force, Reza, with the surname Pahlevi, had himself crowned shah in Dec.,

1925. He adopted many of the steps taken by Kemal Ataturk for the modernisation of Turkey, with whom he made a treaty of friendship and alliance in 1926. These included compulsory education in a country where the pop. was then over 95 p.c. illiterate; general conscription for military service; and the adoption of family names. He also began the building of a great railway across the whole country, from Bandar Shahpur on the Persian gulf to Bandar Shah on the Caspian sea, 872 m.; it was completed in 11 years at a cost of £30 million and opened in Aug., 1938. In May, 1928, he obtained the cancellation of the capitulations and introduced a modern legal system, based on the French. Treaties of friendship were concluded with Russia in 1921 and 1927, and with Afghanistan in 1927.

In his efforts to avoid the influence of both Great Britain and Russia, Reza Shah favoured German enterprise, *e.g.* by entrusting Junkers with the creation of an air line. Thus, when the Second Great War began Persia was a haven for Nazi agents. When Hitler attacked the U.S.S.R., British and Russian troops entered Persia, Aug., 1941, expelling Axis elements. Reza, compromised by those elements, abdicated Sept. 16, 1941 (he died in S. Africa in 1944), in favour of his son Mohammed Reza Shah Pahlevi (b. 1919).

Anglo-Russian Supply Line

Meanwhile, on Aug. 29, 1941, the British and Russian forces had met at Senna, and Teheran was entered by both British and Russians, Sept. 17; but a month later the Russians withdrew to Kazvin and Pahlevi, the British to Hamadan and Sultanabad. New airfields and fortresses were constructed, communications improved, and Bandar Shahpur was developed as a port.

In Aug., 1942, the German advance in Caucasia threatened Persia, and the Allied force known as Paiforce (*q.v.*) was created to defend the oilfields and maintain the line of Anglo-Russian communication, and supply. Over 4,000,000 tons of material was dispatched to the U.S.S.R. through Persia. The highest figure for any one month was 51,000 tons in Feb., 1943. Teheran was the scene of the first conference between Churchill, Roosevelt, and Stalin, at the end of Nov., 1943. An Anglo-Russian treaty of Jan. 29, 1946, which guaranteed the integrity of Persia and the evacuation of the country within six months, led to Persian

conflict with Moscow when an "independence" movement fostered by the pro-Russian Tudeh party tried to separate from Persia the important N.W. province of Azerbaijan. An oil agreement of April, 1946, granting priority to the U.S.S.R. of oil deposits in the N., brought about the Russian evacuation.

Internal Divisions

In home affairs Persian post-war history became one of recurrent unrest, anti-foreigner movements, autonomy demands (*e.g.* among the big tribes of the Qashgai, Bakhtiari, Haiat Daudi), and changes of government. After the Teheran conference had proclaimed Persia's independence as a reward for her declaration of war against the Axis, Sept. 9, 1942, and against Japan, Feb. 28, 1945, Persia joined the United Nations and appealed to it in May, 1946, in her quarrel with Moscow. From Oct., 1946, the Tudeh party were eliminated from the cabinet, and in Jan., 1948, the Majlis rejected the oil agreement with the U.S.S.R. Following an attempt on the life of the shah, martial law was imposed and 20 Tudeh party leaders tried and imprisoned in March-May, 1949. A seven-year economic plan was instituted the same year.

LANGUAGE AND LITERATURE.

The language of Persia is connected with the great Indo-European linguistic system, of which, indeed, it is one of the oldest exemplars. It is written in a variety of the Arabic alphabet, Tarik. Persian literature takes a high place among the literatures of the world. The old Persian inscriptions and the Zend Avesta take us back to the sixth century B.C. and possibly earlier. The Pahlevi tongue belongs to the Sassanian period from the third to the sixth century A.D. Persian in its modern form is perhaps a thousand years old. It was really a renaissance of the old national feeling in the country which brought it into being a century or two after the Arab conquest, and it was responsible for the brilliant outpourings of Firdausi, Sadi, Hafiz, and Omar Khayyam. Among the greatest writers are the romantic poet Nizami (d. c. 1203), the dervish Jelal-ul-din Rumi (1207-73), and the mystic Jami (d. 1492). Of later writers Feth Ali Khan, Tabari, and Vassaf deserve mention.

The poetry of this richly endowed and imaginative people surpassed in bold and extravagant

hyperbole, fantastic imagery, and emotional appeal. The Persian poet heaped metaphor upon metaphor. He was incapable of seeing that what was intrinsically beautiful in itself might appear superfluous and lacking in taste when combined with equally graceful but discordant elements. But there is no doubt as to his eminent ability to coin beautiful phrases, and the mystic and philosophical spirit in which these are couched has perhaps never been surpassed.

Among the most famous poets of Persia were the Sufis or mystics, whose spirit has permeated Persian literature and the Persian mind to a remarkable extent. Sufism has been called the offspring of Neo-Platonism, but it has more probably been sophisticated by Brahmanic or Buddhist influences. It commenced to flourish towards the end of the 10th century, and regarded God not only as the sole source of good, but of being and beauty as well. The great Sufi poet is Jelal-ud-Din, whose *Masnavi* has influenced thought in Persia and Turkey.

Bibliography. Cambridge Ancient History, vol. iv, 1926-27; History of Ancient Persia, R. W. Rogers, 1929; Literary History of Persia, E. G. Browne, new edn., 4 vols., 1928; History of Persia, Sir P. Sykes, new edn., 1930; Persia, Sir A. T. Wilson, 1932; Persia and the Powers, A. H. Hamzavi, 1945.

Persian Gulf. Arm of the Indian Ocean, the ancient Persicus Sinus. It stretches N.W. from the gulf of Oman on the S. to the Shatt-el-Arab and the adjacent regions on the N., is more than 500 m. long, and has an area of 75,000 sq. m. It is bounded S. and W. by Arabia, N.W. by Iraq, and N. and E. by Persia. For the most part its shores, flat on the W. and rising into headlands and heights on the E., are sterile. Its one great river is the Shatt-el-Arab. Its chief islands are the Bahrein group on the W., Babian (Bubiyan) and Abadan on the N., and Kishm on the E. Its harbours are Koweit, Bushire, Lingah, Bandar Abbas, and Basra.

In the 17th century the British and the Portuguese contended for the mastery of the gulf. Early in 1622 the British captured a Portuguese fort on Kishm, and afterwards, in union with a Persian force, captured and destroyed Hormuz, the h.q. of the Portuguese. See Basra; Iraq; Persia.

Persimmon OR VIRGINIAN DATEPLUM (*Diospyros virginiana*). Small tree of the family Ebenaceae, native of N. America. It has

rather thick, oval-oblong, alternate leaves and pale yellow, bell-shaped flowers. The plum-like yellow fruits become sweet and edible after exposure to frost. The wood is hard and blackish. See Ebony.

Persistent Offender. In English law, a person over 21 years of age having several criminal convictions, formerly called Habitual Criminal (*q.v.*). Offenders of 16 to 21 years may be sent to a Borstal institution. Under the Criminal Justice Act, 1948, a persistent offender over 21 convicted of an offence punishable by 2 years' imprisonment or more, who has been twice previously convicted of a like offence since he was 17, may be sentenced to corrective training for 2-4 years. A persistent offender over 30 convicted of such an offence, who has been thrice previously convicted since he was 17 and was on at least two of these occasions sentenced to Borstal training, imprisonment, or corrective training, may be sent to preventive detention for 5-14 years. Alternatively, a persistent offender convicted of such an offence, who has been twice previously sentenced to Borstal or imprisonment or once previously to corrective training, may be required for 12 months after discharge from prison to keep in touch with a society appointed by the Prison Commissioners. If sentenced to 12 months' imprisonment or more, he must be required after discharge to keep in touch with such a society or to report monthly at a police station. Failing in this he is guilty of a criminal offence, and may be arrested without warrant and sentenced to up to 6 months' imprisonment.

Persius (A. D. 34-62). Roman satiric poet, whose full name was Aulus Persius Flaccus. Born of a noble family at Volaterrae, in Etruria, Dec. 4, 34, he studied Stoic philosophy in Rome under Cornutus, and died Nov. 24, 62. He left six Satires, consisting of 650 hexameter lines which display original genius, in spite of their immaturity, excess of literary allusion, and obscure style. There are verse translations by Dryden and Gifford.

Person (Lat. *persona*, theatrical mask). In grammar, the word person is used to indicate the distinction between the person speaking (first person or "I, we") the person spoken to (second person or "thou, you"), and the person or thing spoken of (third person, or "he, she, it, they"). See Trinity.

Personal Equation. The correction applied to observations made by a particular person to compensate for some known inaccuracy of observation—e.g. he may unconsciously always read an instrument too high or too low.

Personality (Lat. *persona*, theatrical mask, character). Etymologically, the quality which enables a being to sustain a part in life. Generally, those qualities which distinguish human beings from things, or one human being from another or, in a narrower sense, existence as a conscious being.

Persons, as opposed to things, are individual, conscious, intelligent, and free. Thus the idea of personality is connected with the moral law; it carries with it the possession of rights and duties, the obligations of which can only be appreciated by beings who are free and intelligent.

According to certain thinkers the word personality is meaningless, and the distinction between persons and things is artificial. Things alone exist; persons are mere appearances, collective varieties of organic forms, and the ego ("I") is only a collection of states of consciousness. The term personality is also used to express the continuance of a person's distinguishing qualities, of one's personal identity, in spite of bodily and mental changes. See Psychology.

Personal Property. Term peculiar to English law. It meant originally all property in respect of which a *real* action (i.e. an action for the *res* or thing) would not lie; but in respect of which only a personal action against the defendant would lie. It comprises all goods, chattels, choses in action, leaseholds; but not freeholds, or things thereunto annexed. The distinction is illogical, and the most logical division of property is into movable and immovable.

Personalty. Legal term used in wills, etc. See Net Personality.

Personation (Lat. *persona*, mask, person). In English law, pretending to be someone else. A person who does this in order to obtain property is guilty of a felony by the False Personation Act, 1874, passed in consequence of the Tichborne case. To personate a master so as to give a false character to a servant is a misdemeanour under an old statute of George III; and the Ballot Act, 1872, made it a criminal offence to personate a voter at an election.

Personification. Literary device by which human attributes are given to inanimate things or

more especially to abstract ideas. It was common in the age of Gray, in whose ode on Eton College we read of :

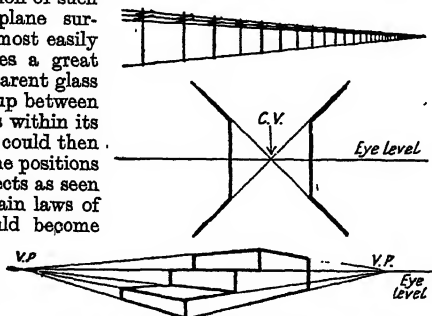
Disdainful Anger, pallid fear,
And Shame that skulks behind . . .
And Envy wan, and faded Care,
Grim-visaged comfortless Despair .

Perspective (Lat. *perspicere*, to look through). The principle governing the apparent size and shape of objects relative to their distance from the eye and their position above or below eye level ; also the application of the principle to the representation of such objects on a single plane surface. The principle is most easily grasped if one imagines a great vertical plane of transparent glass (the picture plane) set up between the eye and the objects within its range of vision. If one could then trace on the flat glass the positions and outlines of the objects as seen through the glass, certain laws of linear perspective would become evident. The most important are as follows :

(1) All horizontal lines receding from the eye appear to slope upwards or downwards towards the horizon level or eye level, those below the eye level appearing to slope upwards and those above the eye level downwards. (2) The farther below or above the eye level such horizontal lines lie, the steeper is the apparent slope upwards or downwards. (3) Parallel horizontal lines appear to come nearer together the further they recede from the eye. If extended they would meet on the eye (or horizon) level at a point called the vanishing point (V.P.). For horizontal lines at right angles to the picture plane the vanishing point is on the eye level immediately in front of the eye, known as the centre of vision (C.V.); the lines to the left of the centre of vision slope upwards or downwards to the right, those to the right slope to the left. Horizontal lines at any angle to the picture plane other than a right angle have their own vanishing point to the R. or L. of the centre of vision. (4) Vertical lines appear to remain vertical, but a series of vertical lines of the same height and at equal distances from each other, appear to become shorter and nearer together the farther distant they are from the eye.

These general laws, with others more complicated, e.g. those concerning lines neither vertical nor

horizontal, as well as those concerning reflections and cast shadows, may be worked out accurately on mathematical principles, but it must be remembered that they are concerned with a single fixed range of vision. If the vision is moved even minutely to left or right, a new picture plane is immediately set up. In practice the human eye will correct the apparent distortions which follow. For example, suppose the eye to be directly confronted by a wall,



Perspective. In the top fig. the receding horizontal lines, as projected on the picture plane, slope towards a vanishing point on the eye level, and the vertical lines, representing a receding series of poles of equal height and equal distance apart, become shorter and nearer together. The middle fig. shows how horizontal lines at right angles to the picture plane appear to converge towards a centre of vision on the eye level. The lowest fig. shows the effect when horizontal lines are at an angle to the picture plane other than a right-angle : note that the horizontal line which is actually on the eye level remains horizontal.

the horizontal top of which is above eye level, but that the wall is too close for the whole of it to be seen at one glance. By the laws of perspective, the top of the wall should appear to slope downwards towards the eye level on both sides of the centre of vision ; and as the eye turns to left or right, setting up new picture planes to which the line of the wall is no longer parallel, the eye will, in fact, follow the line downwards in a curve, but is scarcely conscious of doing so. The camera has made us familiar with the odd effect of uncorrected distortion when objects are too near. A moving or panoramic camera, as it moves to left or right altering its centre of vision, is likewise unable to correct the effect of curve ; hence when a photograph is required of a wide group of people they are arranged in a curve, and the camera then records them as arranged in a straight line ; but any building in the background is distorted into a curve.

For the artist who wishes to represent objects recognizably on a flat surface some appreciation of

the laws of linear perspective is essential. He will use also what is called aerial perspective, which, being concerned with the relative tones, colours, and clarity of objects seen at different distances, through the atmospheric veil, is much more a matter for sensitive observation and feeling than for science. See Drawing.

Perspiration. Excretion of water from the skin through the sweat glands. In the human being, the sweat glands consist of small coiled tubes situated in the deepest part of the true skin, from which a duct passes up to the surface. The secreting tube is lined by columnar cells, outside of which is a layer of muscular fibres. Sweat glands are abundant all over the skin, but are most numerous on the parts which are free from hair, particularly the palms and soles.

There is always a certain amount of activity in the sweat glands, but the secretion, as soon as it reaches the surface, is evaporated, and thus normally the skin feels dry. This is accordingly known as insensible perspiration. Under the influence of exercise, heat, or certain emotions, the activity of the sweat glands is greatly increased, and the secretion then collects on the surface, forming beads or drops of sweat. This is sensible perspiration. The physiological function of sweating is to assist in regulating the body temperature by the dilatation in heat and the shrinkage in cold of surface blood vessels. Anidrosis is abnormal diminution in the quantity of sweat excreted. It is seen in diabetes, myxoedema, and some affections of the nervous system. See Hyperidrosis.

Persulphuric Acid. An acid formed when sulphur heptoxide (S_2O_7) is dissolved in water. It is made by the action of sulphuric acid on ammonium or barium persulphate. It is formed during the working of accumulators, by electrolysis of the sulphuric acid. On dilution with strong sulphuric acid mono-persulphuric acid is formed. The salts of persulphuric acid known as persulphates are used as oxidising agents.

Perth. Royal and municipal burgh and county town of Perthshire, Scotland. On the Tay, it is 48 m. by rly. N. of Edinburgh. The wooded hills of Kinnoull, rising to 729 ft., and of Moncrieffe, 725 ft., the magnificent river, and the impressive back-



Perth arms

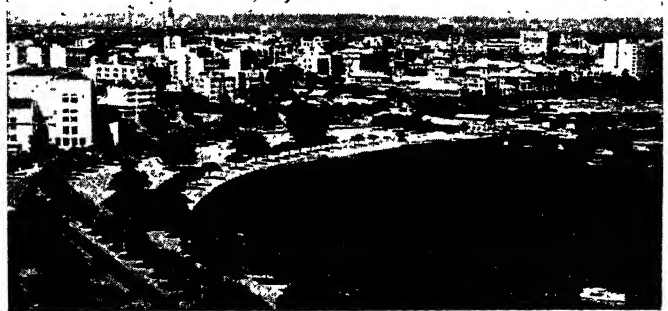


Perth, Scotland. View from Bridgend showing the bridge over the Tay
British Railway Executive

ground of the Grampians combine to form an environment fully justifying its being called the Fair City. An ancient city, it was noted for its noble ecclesiastical edifices, but of these there remains only the 13th century cruciform church of S. John, from which it derived its former name of St. Johnstown, and in which in 1559 John Knox preached his celebrated sermon against idolatry. Other prominent buildings are S. Ninian's episcopal cathedral (1850-90), the new city hall, the general convict prison for Scotland, and the municipal buildings, the latter on the site of the palace in which the Gowrie conspirators met. The city has a large infirmary, public library, art gallery and museum, and barracks. There are several schools, but the castle and the market cross have been pulled down.

An imposing nine-arch bridge, 840 ft. long, across the Tay communicates with the suburb of Bridgend, and along the W. bank of the river extend two public parks—the N. and S. Inch. Dyeing is the staple industry, and brewing, ironfounding, and the manufacture

of ink, linen, gauge glasses, floor-cloth, and chemicals are carried on. From here steamers go to Dundee and other ports on the E. coast. It has valuable salmon fisheries and large cattle markets are held.



Perth, Western Australia. View of the centre of the capital city, with Mount's Bay road bordering the Swan river and the Darling ranges in the distance
Bu courtesy of the Australian News and Information Bureau

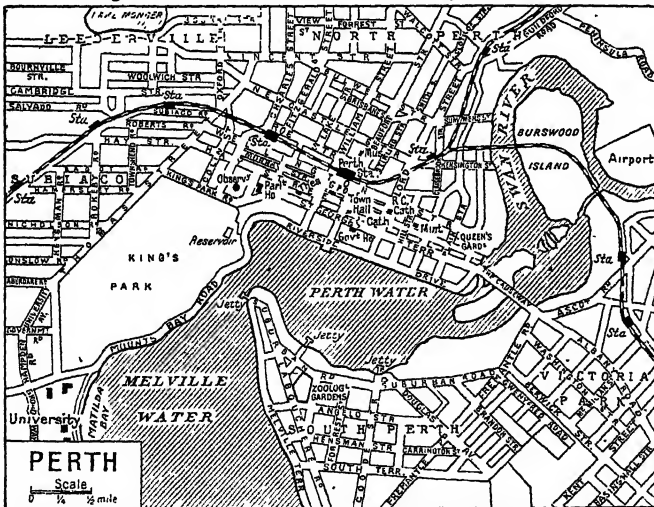
Said to have been founded by Agricola in A.D. 70, Perth has a wealth of historical memories. A burgh in 1106, it was constituted a royal burgh in 1210, and was the Scottish capital till 1482. Many times besieged, it was taken by

Bruce in 1311, and Edward III in 1335. The scene in 1396 of the combat between the Quhele and Chattan clans, described by Scott in *The Fair Maid of Perth*, and of the murder of James I in 1437, it was captured by Montrose in 1644, and again by Cromwell in 1651. Market day, Fri. Pop. est. 39,700.

Perth. Capital city of Western Australia. It stands on the Swan river, 12 m. N.E. of the port of Fremantle at its mouth. The chief public buildings are Government House, Parliament House, town hall, mint, public library, and the university of W. Australia. The city has a museum and art gallery, zoological gardens, and extensive public parks, King's Park covering

1,000 acres. There are cathedrals for both Anglicans and Roman Catholics, Perth being the seat of the primate of W. Australia. There are electric tramways and trolley buses. South Perth, Nedlands, Mount Lawley, and Dalkeith are suburbs. Perth was founded in 1829 and made a municipality in 1856. Its growth, however, was due to the discovery of gold at Kalgoorlie in 1893. Exports are wheat, wool, fruit, dairy produce, gold, and timber. Pop. 260,000.

Perth, EARL OF. Scottish title borne by the family of Drummond since 1605, when James, Lord Drummond, was made an earl. The 4th earl, James (1648-1716), was made a duke by James II when in exile. He had been lord chancellor of Scotland, but after 1688 he left the country. The three succeeding dukes, for so they were called although the title had no validity, were prominent Jacobites. The title became extinct when the 6th duke died in 1760. Claimed without success until 1853, the title was conceded to George Drummond (1807-1902), brother of the 1st duke of Perth. The story of the earls of Melfort is similar; they were



Perth, Western Australia. Plan of the city, showing the jetties on Perth Water and the suburb of South Perth

Jacobites, received a dukedom from James II, and lost practically all in the Stuart cause. George Drummond counts as 14th earl of Perth. The 16th earl is noticed separately. An eldest son bears the courtesy title of Viscount Strathallan.

Perth, JAMES ERIC DRUMMOND, 16TH EARL OF (b. 1876). British diplomatist. Born Aug. 17, 1876, and educated at Eton, he entered the Foreign office in 1900. He was one of the prime minister's private secretaries, 1912-15, then private secretary to the

foreign minister until 1919. For 14 years Sir Eric Drummond was secretary-general to the League of Nations. He was British ambassador in Rome, 1933-39, returning to become chief adviser on foreign publicity at the ministry of Information, 1939-40. He was knighted 1916; succeeded to the earldom, 1937; and became a representative peer for Scotland in 1941.

Perthite. Variety of red feldspar found at Perth, Ontario, Canada. Consisting of laminations of orthoclase and albite, it is used as a gem stone. See Orthoclase.

Perthshire. County of Scotland. Its area is 2,493½ sq. m., making it the fourth largest in the country. It belongs partly to the Highlands and partly to the Lowlands, and is pierced by the Firth of Tay. The surface is mountainous. In the N. and W. are the Grampians; a large number of its heights exceed 3,000 ft., among them Ben Lawers, Ben More, Ben Lui, and Schiehallion. In the S. and E. are the Sidlaw and Ochil Hills. The chief river is the Tay; among its tributaries are the Almond, Earn, Tummel, and Lyon. The Teith and Allan flow to the Forth. The largest of many lochs are Tay, Erich, Vennachar, Rannoch, Katrine, and Achray. Across the S.E. stretches the valley of Strathmore, and in the E. is the Carse of Gowrie. Beautiful glens, e.g. Garry, abound, and herein are the Trossachs, the pass of Killiecrankie, and other famous spots.

Perth is the county town and largest place. Other towns are Crieff, Blairgowrie, Dunblane, and Auchterarder. Holiday resorts include Pitlochry, Aberfeldy, Comrie, and Callander. In the county, too, are Abernethy and Blair

Atholl. Agriculture is the chief industry, but a large proportion of the land is given up to deer forests and grouse moors. Oats, barley, and wheat are grown; horses and cattle are reared. A large number of sheep are fed on the hills. An earthquake belt occurs near Comrie. With Kinross-shire two members are returned to parliament. Perthshire was the headquarters of the kingdom of the Picts. Their capital was in turn Abernethy, Forteviot, and Scone; and Scone long remained the coronation place of the Scottish kings. There are relics of a Roman camp at Ardoch. Pop. 120,772.

LITERARY ASSOCIATIONS. These are especially notable in connexion with Scottish song. Caroline, Baroness Nairne, author of *The Land o' the Leal*, *Callers Herrin'*, and other familiar songs, was born in the Auld House of Gask. Henry Adamson (d. 1639), the friend of Drummond of Hawthornden and author of *The Muses' Threnodie*, was born at Perth. David Mallet, or Malloch (c. 1705-65), was born at Crieff; Dugald Buchanan (1716-68) was born at Ardoch; and Duncan MacIntyre (1724-1812), although of Argyllshire birth, is said to have found much of his inspiration for his poems in Perthshire. Robert Nicoll (1814-37), poet and prose writer, was born at Little Tulliebeltane, Auchtergaven; George Gilfillan at Comrie; and Charles Mackay (1814-

89), Scots song-writer and author of *Cheer, Boys, Cheer*, at Perth. Notable books on the county include *History of Perthshire*, T. H. Marshall, 1849.

Perthus or **PORTUS**, COL DU. Pass over the E. Pyrenees, on one of the roads leading from Perpignan in France to Figueras in Spain. It is defended on the French side by Fort Bellegarde.

At the end of the Spanish Civil War the district became a centre from which Catalan refugees escaped into France. On Feb. 6, 1939, the frontier was thrown open by the French to admit troops as well as civilians. Gen. Franco's artillery and air force bombarded and bombed the assembled refugees, of whom over 250,000 crossed the frontier in a few days.

Pertinax, **PUBLIUS HELVIUS**, Roman emperor from Jan. 1 to Mar. 28, A.D. 193. A man of humble birth, born at Alba Pompeia in Liguria, he entered the army. He distinguished himself in the wars with the Parthians and in Britain, and after the murder of Commodus he was invited to become emperor. But the discipline which he attempted to re-establish proved so irksome to the spoilt soldiery that he was murdered in less than three months. On his death the empire was sold by auction to Didius.

Pertinax. Pen-name of Charles Joseph André Géraud, French publicist. Born Oct. 18, 1882, he



Perthshire. Map of the Scottish county celebrated for its picturesque glens, passes, and lakes

was educated at the university of Bordeaux. From 1908 to 1914 he was London correspondent of the *Echo de Paris*, in which from 1917 to 1938 he contributed a daily article. In 1919 he opposed the creation of the League of Nations as inconsistent with existing alliances. He was editor of *L'Europe Nouvelle* during 1938-40, and on the defeat of France went to the U.S.A. where he became diplomatic correspondent of the North American Newspaper Alliance, also contributing to the *Daily Telegraph*, London, and *France-Soir*, Paris. His book

Les Fossoyeurs, a study of Gamelin, Daladier, Reynaud, Pétain, and Laval, published in New York in 1943, was translated into English as *The Gravediggers*.

Perturbation. Term used in astronomy for the disturbance in the orbits and positions of the planets and comets caused by the attractions which they exert on one another. It was from unexplained perturbations in the movements of Uranus that Adams and Leverrier predicted the existence of the planet Neptune.

Pertussis. Scientific name for whooping cough (*q.v.*).

of sugar, cotton, and coffee. Between these cultivated strips the coastal plain is almost desert.

The montaña, a region undeveloped, mostly difficult of access, and in parts still unexplored, presents a striking contrast to the other parts of the republic. The montaña slopes down from the E. spurs of the Andes to the interior of the continent. Here flourishes the vast virgin forest of the damp Amazonian basin. The waters teem with fish; serpents and alligators abound; gorgeous birds of every size, from the gigantic heron to the tiny hummingbird, haunt the woods and waters. Innumerable streams wind through the forest, feeding the upper waters of the Amazon. Three great navigable rivers cut their way by gorges through the E. Cordillera, namely, the Marañon, which is the main stream of the Amazon, the Huallaga, and the Ucayali, which rises in the S. of the country and receives many affluents in its long course N. The long navigable stream of the Javary forms the Brazilian boundary through most of its course.

The pop. in 1940 was 7,023,111, of whom 46 p.c. were pure Indian, 53 p.c. white or mixed. The ruling class, of almost pure Spanish descent, numbers c. 500,000; Chinese and Japanese, c. 42,000; British residents, c. 2,300; U.S. citizens c. 1,100; pure Negroes, c. 30,000.

The peasantry, villagers, and labourers of the sierra, the Cholos, are pure Indian, a gentle, somewhat apathetic and melancholy race. They still speak Quichua, the language of the Incas. The Aymara language also survives; but on the sierra most of the Indians know something of Spanish. Small and scattered tribes of uncivilized Indians inhabit the recesses of the montaña.

The capital and largest town is Lima (*q.v.*), with a population of 522,828. Callao, the port, linked with Lima by rail and tramway, has about 75,000 inhabitants. Arequipa, situated on the S. uplands but connected with the coastal region, has about 46,000. Other towns of note are the seaports Mollendo and Paita, Trujillo (30,000) in the N. near the coast, Cuzco (40,000) and Ayacucho (20,000) in the sierra, and Iquitos (40,000) on the Amazon.

GOVERNMENT. Under a constitution promulgated on April 9, 1933, Peru has a chamber of deputies of 153 members, and a senate of 49 members elected for

PERU: A REPUBLIC OF THE ANDES

* Captain Grenville Holms and others

Supplementary to this article are entries on the cities and towns, lakes and rivers of Peru. See also Andes; Chile-Peruvian War; Cordilleras; South America; Inca; Yunca

Peru (*El Perú*), a S. American republic bordering the Pacific and lying wholly within the southern



Peru arms

Tropics, forms an irregular oblong stretching about 1,200 m. from N.W. to S.E. The area, estimated at c. 482,000 sq. m., is uncertain owing to frontier disputes with Ecuador and Colombia on the N., Brazil on the E., and Bolivia on the S.E. The dispute with Chile on the S. was settled, through U.S. mediation, in 1929, when Tacna went to Peru, Arica to Chile.

Peru is not in itself a distinct geographical region, but forms part of the Andean system of S. America, being traversed throughout its whole length by the stupendous mountain system of the Cordilleras. The Peruvian part of this gigantic mountain system has a peculiar magnificence of its own, owing to the fact that the Western Cordillera here rears itself precipitously, like a huge irregular wall, broken by many ravines, almost from sea level to a height of 16,000 ft., even the passes between the peaks mostly exceeding 14,000 ft. This W. range forms a continuous barrier running parallel to the Pacific coast. A broad plateau, from 11,000 to 13,500 ft. above sea level, stretches between this range and the still loftier chain of the Eastern Cordillera, whose snow-peaks rise to more than 20,000 ft. The plateau is broken by many subsidiary mountain masses, and in its N. part is traversed by the central Cordillera. Near Cuzco the ranges converge, and are heaped together into the rugged

transverse ridge or "knot" of Vilcanota. S. of this the plateau widens out between two ranges, enclosing L. Titicaca and stretching into the yet broader Bolivian plateau. L. Titicaca forms the main part of a hydrographical system of inland drainage.

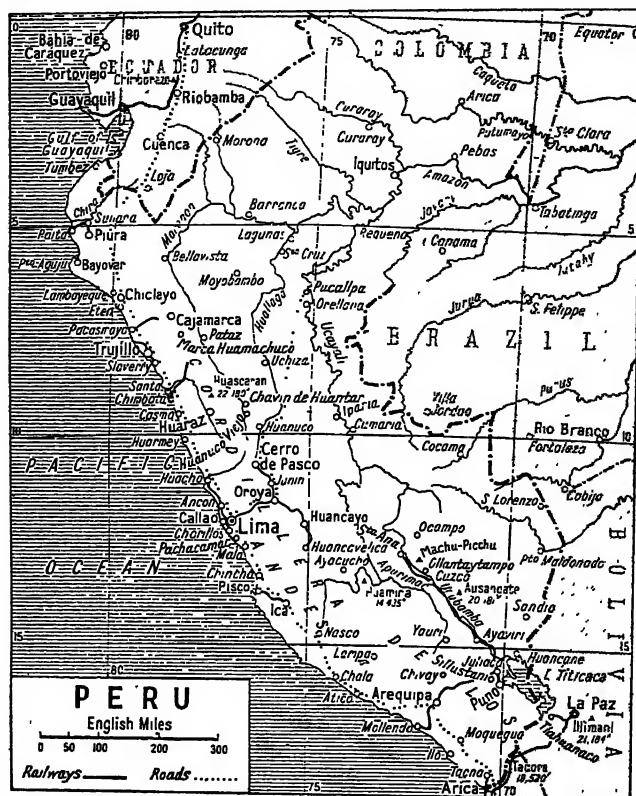
This vast mountain system cuts Peru into three distinct longitudinal zones: the rainless coastal plain, from 30 to 60 m. wide; the sierra or mountain system itself, about 250 m. wide; and the montaña, the remote inland region of forest which clothes the eastern slopes of the Andes, and stretches far into the Amazonian basin. The mountains determine the rainfall and the extraordinary contrast between the E. and W. regions of the republic. The moist trade-winds, sweeping across the continent from the Atlantic, upon striking the barrier of the E.



Peru flag; red, white, and red

Cordillera are forced upwards and chilled, and shed copious rains.

On the other hand, because the cold Humboldt (or Peru) current cools winds blowing in from the Pacific, before they reach the shore and the mts., the coastal plain between the Andes and the Pacific is rainless, although in the winter—from about May till October—the daily *garra*, a mist often breaking into a slight drizzle, moistens the soil and revives vegetation. The many short and rapid rivers descending from the Andes to the Pacific permit strips of irrigation, which yield abundant crops



Peru. Map of this Andean republic, at one time the most important Spanish colony in South America

six years. The president is elected for five years, and is not eligible to succeed himself. Males of 21 and over able to read and write are eligible to vote, which is compulsory from 21 to 60. The president appoints the eleven ministers of his cabinet. The 24 departments are divided into 134 provs. plus the constitutional prov. of Callao.

The R.C. religion enjoys state protection, but all religions are tolerated. Military service is compulsory. The army on a peace footing numbers some 30,000. The navy includes two out of date cruisers and an old destroyer, four submarines, a river flotilla, and some auxiliary vessels. Both army and navy have aviation corps.

The monetary unit is the sole (worth 15.38 U.S. cents) divided into 100 centavos. The metric system of weights and measures is general but not compulsory.

Elementary education is free and compulsory from 7 to 14; secondary education was made free in 1946. Travelling teaching units tour the Indian villages. In Lima is the central university of San Marcos, founded in 1551, as well as

the R.C. university. There are other state universities at Arequipa, Cuzco, and Trujillo.

First in value of exports comes sugar. Other important exports are cotton, petroleum products, copper, lead, and wool. Peru gave quinine and also the potato to the world. The principal imports are machinery, vehicles, and electrical goods, food, textiles, chemicals and dyes, pharmaceutical goods, and metallic products. There are large deposits of iron at Marcona, and excellent coal lies near by. Peruvian industry includes oil refineries, copper smelters, and the first rubber tire factory on the S. American W. coast. Local factories produce cheap cotton textiles as well as substantial quantities of woollen cloth, leather goods, cement, chemicals, drugs, tobacco, and processed foods.

In the coastal zone the natural and most convenient transport is by sea; about 25 ports, most of them mere villages with open roadsteads, serve this coastal traffic. Callao, the chief port of external trade, is situated on a spacious sheltered bay and possesses fine

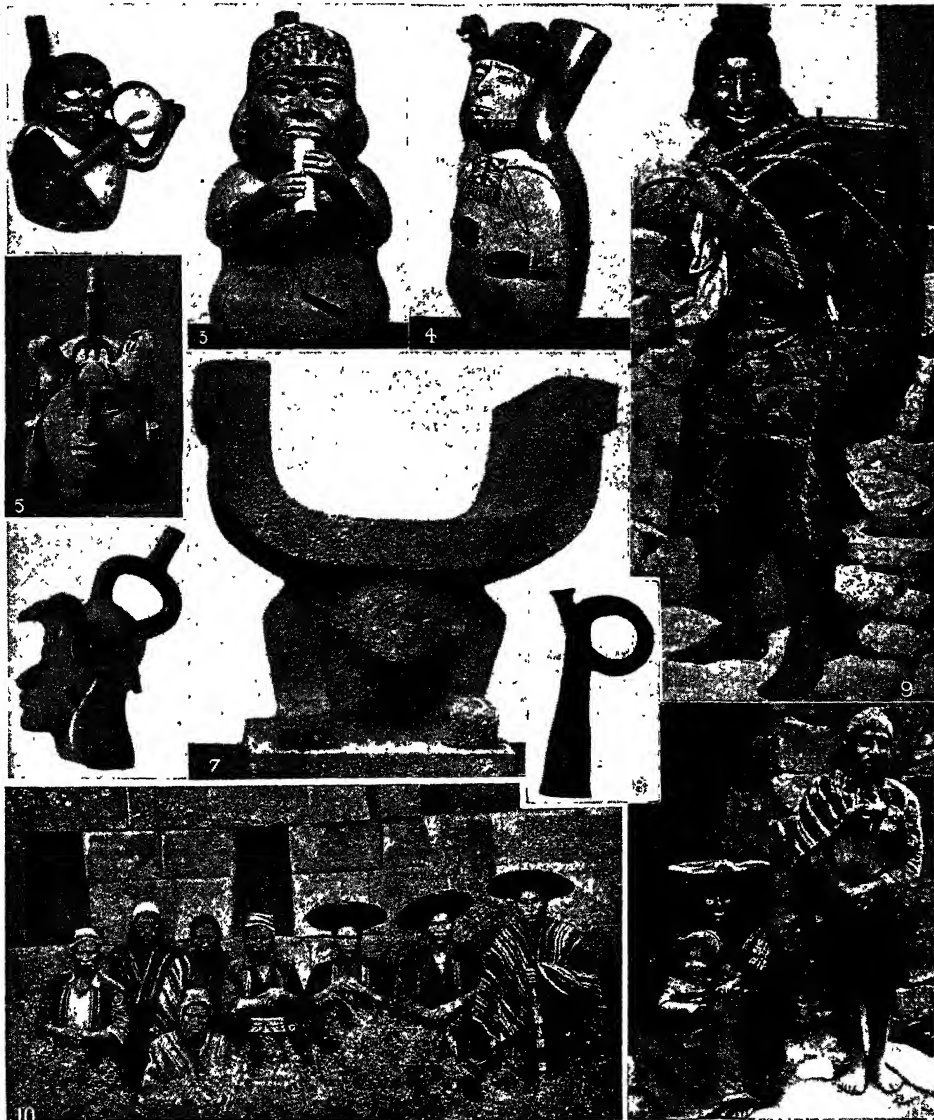
docks and wharves. Mollendo is the second port. Paita, in the N., possesses a fine natural harbour. Short rlys. link seaports with centres of production.

The Andean plateau has access to the sea by two mountain railways. One of these, the Callao-Oroya line, traverses a pass in the W. Cordillera higher than the summit of Mont Blanc, and descends thence about 3,000 ft. to Oroya, which is linked by a N. extension to the great copper mines of Cerro de Pasco. Another extension passes S. to Huanavelica, and will eventually join the Southern rly., which mounts from Mollendo to Arequipa, and thence over the W. Cordillera to the shore of L. Titicaca at Puno, whence steamers connect it with the Bolivian rly. system. A N. extension joins Puno with Cuzco and Sta. Ana. Total length of Peru's rlys. is 2,758 m. There are more than 20,000 m. of road suitable for motor traffic. The central highway from Lima to Oroya, completed 1935, was extended 1943 to Huanuco and Pucallpa on the Ucayali, making possible a journey by road and river from the Pacific to the Atlantic. The Peruvian section of the Pan-American highway is complete. Commercial air-lines have helped to make the interior more accessible, and link the principal towns of the coastal plain. But much of the transport on the sierra is still carried by troops of llamas driven by Indians.

The montaña depends almost entirely on river transport. The river port of Iquitos, 2,300 m. from the Atlantic, is visited by ocean steamers. Large river steamers navigate great stretches of the Amazonian affluents; and it is impossible to estimate the immense extent of streams navigable by smaller craft and motor-boats.

ARCHAEOLOGY. The material remains of pre-Columbian Peru pertain to a wide geographical region dominated by the Aymará and Quichua people. It embraced N.W. Argentina and Bolivia, besides impinging in N. Chile on the Araucanian and in Ecuador on the Chibcha region.

Before the Christian era the Yunca, or rainless and stoneless coastal valleys, were occupied by fishing tribes, whose vast shell-mounds have yielded their bone implements and some basketware. There came among them, traditionally from the sea—whether from middle America, the W., or both, is undetermined—an agricultural people who erected truncated



1. Decoration from ancient terra-cotta vessel. 2. Earthenware musical instrument. 3. Figure in pottery of man playing a flute. 4. Pottery figure of an official, probably a portrait. 5. Pottery head, full face. 6. Pottery head, profile. These four figures illustrate the skill with

which the ancient Peruvian craftsmen portrayed features. 7. Stone seat from Manabi, Ecuador. 8. Earthenware trumpet. 9. Inca water carrier from Cuzco. 10. Natives of the Yucay Valley. 11. Present-day Indians in dress similar to that worn in the Inca period

PERU: RELICS OF THE PAST, AND PERUVIANS OF THE PRESENT DAY

pyramidal mounds of adobe for burial and for the platforms of residential structures. The N. section, round Trujillo, called early Chimu, is marked by pottery moulded into human, animal, and vegetable forms. The S. section, called early Nasca, is marked by pottery with painted decoration.

In the well-watered Andean uplands, amply supplied with stone, arose another agricultural people, who domesticated the llama for transport and the alpaca for wool. Using stone tools, they set up remarkable megalithic structures, notably at Tiahuanaco near L. Titicaca, in the Cuzco valley, and at Ollantaytambo, which guarded the Amazon pass. To this archaic period succeeded a new artistic outburst which, down to the 8th century, intermingled with the coast cultures. It was marked by stone carving, weaving, and goldwork, and a southward migration produced the Diaguite or Calchaqui culture of N.W. Argentina.

The remnants of one of the megalithic dynasties, apparently under pressure from the coast, took refuge in a fastness called Tampu-Tocco, identified by Bingham in 1911 with Machu-Picchu in the Urubamba valley. Besides cyclopean remains this site yielded pictographic stones, showing that an undeveloped system of record preceded that of the later quipus or knotted cords. By about 1100 the Inca tribe, perhaps emerging from Tampu-Tocco, began to dominate the highlands, while the later Chimu and Nasca cultures on the coast independently reached a new zenith of their own, before being absorbed into the Inca empire.

Megalithic Remains

The most imposing megalithic remains are at Tiahuanaco. At Sillustani on L. Umayo are numerous burial-towers or chullpas, and stone circles. From Chavin de Huantar, in the Marañon valley, came a diorite stela 25 ft. high, sculptured to represent a deity. The Inca builders used smaller blocks for their edifices, which were sometimes many-storeyed, as on the islands in L. Titicaca and at Pachacamac. At Marca Huamachuco are extensive llama-corral; at Huanuco Viejo a series of stone baths. The Inca constructed stone aqueducts and bridges, terraced hillsides for cultivation (which are still in use), and paved highways throughout the empire. *Consult Ancient Civilizations of the Andes, P. A. Means, 1931.*

HISTORY. The Incas, during four centuries of domination, by

a process of elaborate and steady conquests had brought under their sway an empire measuring more than 1,500 m. from N. to S., and comprising approx. the present territories of Bolivia, Peru, and Ecuador. The Inca conquest of Quito in the 16th century, and the death of the conqueror, were followed by a destructive civil war between the rightful heir, Huascar, and his half-brother, the usurper Atahualpa. Thus the distracted state of the country partly accounts for the fact that a policy so extensive and apparently so well organized fell before a handful of Spanish adventurers. After seven years of preliminary effort and exploration, and after suffering indescribable hardships, Pizarro (*q.v.*) landed at Tumbez in 1531; he advanced into the interior, treacherously put to death Atahualpa, and in 1533 entered the capital Cuzco. In 1535 he founded the present capital, Lima. Notwithstanding some later native attempts at resistance, favoured by quarrels among the Spanish conquerors, the Inca empire had fallen, and about the middle of the 16th century the authority of the Spanish viceroy was established.

Under Spanish Dominion

For two centuries the history of Peru was virtually the history of Spanish S. America. For the viceroy, installed at Lima, not only ruled his own vicerealty, comprising the present territories of Bolivia and Peru, but also held authority over almost all the Spanish governors upon the continent.

The seat of the viceroy, Peru itself had a less agitated and eventful history than the other "kingdoms" of S. America. The interest of its history is mainly concerned with administration and finance; for it was the viceroy's duty to transmit to Spain the royal share of the precious metals mined in Peru, particularly in the silver mines of Potosí (now in Bolivia). In the course of the 18th century many reforms were made, and two new vicerealties, in New Granada and in Buenos Aires, were set up, independent of Peru. In the year 1780 a serious native revolt shook the vicerealty. The revolt was suppressed by loyal Indians under Spanish officers, and was followed by barbarous executions.

During the revolutionary movements in other parts of the continent during 1810-22, Peru was the stronghold of Spanish authority. Indeed, royalist expeditions sent thence drove the Argentine invaders from Upper Peru (now

Bolivia), and reconquered Chile. However, in 1820 an army and fleet, under San Martín and Cochrane, invaded Peru from Chile, and in 1821 San Martín entered Lima, and proclaimed himself protector of Peru. But the war continued for three years longer. Lima for a time was re-occupied by the royalists, and it was not until 1824 that the battle of Ayacucho ended Spanish dominion in S. America.

Independence and Wars

For three years Peru recognized the authority of Bolívar, "the Liberator"; upon his departure, in 1826, the republic entered upon the stormy career characteristic of tropical republics of mixed blood, presidents and dictators succeeding one another with bewildering rapidity. In 1836 the attempt of the Bolivian, Santa Cruz, to unite Bolivia and Peru under his dominion led to war with Chile. From 1845 to 1862 domination by Ramón Castilla brought comparative tranquillity, better administration, and economic progress. But after him the old disorders re-occurred, and trouble with Chile over frontiers was deferred by war with Spain (1864-66).

The frontiers of Peru, Bolivia, and Chile in the coastal desert were not a burning question until it was discovered that the desert might yield great wealth, first in the form of guano, and then in that of nitrates, and this led to the war between Chile and the allied republics of Peru and Bolivia (*see Chile-Peruvian War*). The victorious Chileans occupied Lima for nearly three years. The war was a severe blow to Peruvian prosperity, and political disorders rendered recovery more difficult. Yet Peru has shared the general South American movement of consolidation and settlement.

In the First Great War the republic was driven by German attacks on shipping to break off diplomatic relations with Germany, seize the German ships at Callao, and open the Peruvian ports to the Allies. In the Second Great War Peru declared war on Germany and Japan, Feb. 12, 1945. She took no active part in the war, but was an important source of raw materials for the Allies. She was a foundation member of the United Nations organization.

Bibliography. History of the Conquest of Peru, W. H. Prescott, rev. ed. 1905; Peru, C. R. Enock, 1908; Peru: its Story, People and Religion, G. Guinness, 1909; Peru, E. C. Vivian, 1914; Llama Land, A. Dell, 1927; History of Peru, J. Vaelega, 1938.

Pern, BALSAM OF. Liquid exuded from the trunk of *Myrciaylon pereirae* of Central America, after beating and scorching the bark. It is used in medicine as a stimulating dressing for wounds and as an expectorant in bronchitis.

Perugia. A province of central Italy, covering most of the region of Umbria. It is mainly mountainous, being traversed by the Apennines, is watered by the Tiber and affluents, and contains the Trasimene Lake. The mountains yield iron, coal, and marble, while the valleys produce wheat, olives, and grapes. Much wine and olive oil are produced. Perugia is sparsely inhabited. See Umbria.

Perugia (anc. *Perusia*). Italian city, capital of the prov. of the same name. It is picturesquely placed on hills at an alt. of 1,705 ft. overlooking the Tiber, 10 m. E. of the Trasimene Lake or Lago di Perugia, and 126 m. by rly. N. of Rome. Irregular in plan, its medieval walls enclose separate hill tops. There are remains of the Etruscan terraced walls, gates, and tombs.

The 15th century Gothic cathedral of San Lorenzo, adorned with fine paintings and carvings, is still unfinished. Among many interesting churches is that of San Pietro, a curious edifice founded about 1000, rich in masterpieces by Perugino and others. The university, founded 1307, houses a collection of Etruscan and Roman antiquities, and a library. The great Gothic municipal palace (1281-1333) has a valuable collection of pictures by Umbrian masters. In the cathedral square are a large fountain, a statue of Pope Julius III, and the money changers' hall (1453), with beautiful frescoes by Perugino. There are also an academy, a school of art, a public library, a botanical garden, and an observatory. The manufactures include liqueurs, silk and woollen goods, and there is a considerable trade in corn, fruit, wine, and oil. Perugia was one of the twelve cities of Etruria. It was captured

by the Romans in 309 B.C., was destroyed by Octavian in 41 B.C., in the so-called Perusine war against Lucius Antonius, and again destroyed by Totila, 549. For 13 centuries it was more or less subject to the popes, and was annexed to the dominions of Victor Emmanuel in 1860. Pop. 82,407.

During the Second Great War Perugia was captured from the Germans by troops of the 8th army after heavy fighting in the outskirts. The city escaped damage except for the blowing up of the 13th century bridge of S. Giovanni by the Germans.

Perugino or **PIETRO VANNUCCI** (1446-1524), Italian painter. Born at Città della Pieve, he studied



Perugino,
Italian painter
Self-portrait

at Perugia and in the school of Verrocchio at Florence. He worked in Florence and Perugia till 1480, when he was employed by Pope Sixtus IV on the decoration of the Sistine chapel and other portions of the Vatican; when he returned to Florence Raphael became his pupil. He was among the first of the Italians to use the oil medium successfully, though he painted also in tempera, and his graceful figures, with their poetic landscape background, procured him a wide reputation. He died at Fontignano, near Perugia. There are five works by him in the National Gallery.

Peruke. Artificial head of hair, a variant of periwig. See Wig.

Peruvian Bark. Former name for the bark of various species of *Cinchona* imported from Peru and Bolivia for the sake of the quinine contained in it. The story of its discovery, and of the subsequent introduction of the trees into India, is told in the article on bark (*q.v.*). The species yielding the highest percentage of quinine

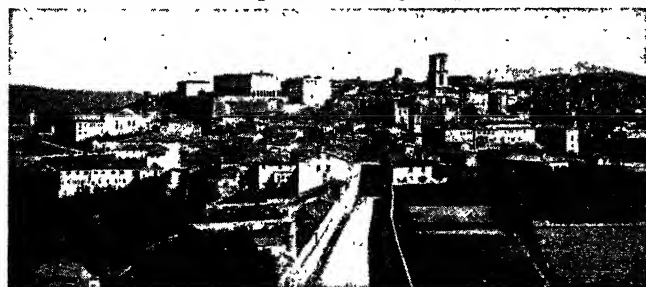
are *C. calisaya* and *C. ledgeriana*, known as yellow barks. Red bark (*C. succirubra*) is the species that has been grown most extensively in the Himalayas and Nilgiris. In Java, which supplies about nine-tenths of the world's requirements of bark, the species chiefly grown is *C. ledgeriana*. See Cinchona; Markham, Sir C. R.

Peruvian Mastic Tree. Californian pepper-tree (*Schinus molle*), a small fragrant tree of the family Anacardiaceae. It is indigenous in Brazil and Peru. The alternate leaves are divided into many pairs of lance-shaped leaflets with toothed edges. The small, yellow-white flowers are clustered and succeeded by pea-like, rosy fruits of an oily nature. The resinous sap that gives its fragrance to the tree is used by the Peruvians as an astringent for the gums, and the root is used medicinally.

Peruzzi, BALDASSARE (1481-1536). An Italian architect and painter. Born near Siena, he studied probably under Pacchiarotto. He painted at Siena without obtaining eminence, and then went to Rome, where he built the Villa Farnesina for Agostino Chigi. This success induced him to devote himself to architecture, and in 1520 he was appointed architect to S. Peter's. After the sack of the city in 1527, when he was robbed of his possessions, he fled to Siena, where he became city architect. He died in Rome, Jan. 6, 1536. *Prom. Perootsy.*

Perversion (Lat. *pervertere*, to turn about). Term for an anomaly of psychological development in which the patient shrinks from normal sexual behaviour, but can find gratification in some substitute activity. The principal perversions are homosexuality; exhibitionism; fetishism; sadism, and its derivative masochism. In very mild forms they are widely distributed among normal people. See entries under all these heads; also Oedipus Complex.

Pesaro. City of Italy, the capital of the prov. of Pesaro e Urbino. It stands on the river Foglia, near its mouth in the Adriatic Sea, 37 m. by rly. N.W. of Ancona. The old cathedral, now closed, has a 12th century mosaic pavement, and the new one has a famous picture by Bellini. The prefecture was built in the 15th century for the Sforzas, whose fortress (1474) remains. The museum contains a rich collection of art pottery, furniture, etc. The conservatoire was founded by Rossini, a native of the city. An



Perugia, Italy. General view of the capital city of the province

old Roman bridge spanned the Foglia. Manufactures include silks, woollens, majolica, glass, iron, and sealing-wax, and Pesaro is noted for its figs, which are exported in large quantities. Founded as Pisaurum by the Romans in 184 B.C., it was destroyed by the Goths and restored by Belisarius. Pesaro was a papal possession in the 8th century, and was later ruled by the houses of Malatesta, Sforza, and Rovere, falling again to the popes from 1631 to 1860.

During the Second Great War Pesaro was captured by Polish forces of the Allied 8th army, supported by gunfire from British destroyers, in a fierce battle Aug. 31–Sept. 2, 1944, against the German 1st parachute div., the defenders of Cassino. The town, damaged by Allied bombing and shelling, was also mined and otherwise damaged by the Germans. The cathedral roof was shaken by blast, the church of S. Antonio was gutted. Most works of art had, however, been removed to safety. Pop. 51,560. *Pron.* Pezz-aro.

Pesaro e Urbino. Prov. of N.E. Italy, in the Marches. It extends from the Apennines to the Adriatic Sea, and its area is 1,118 sq. m. A mountainous prov., its fertile valleys produce grain, fruit, wine, and oil. Iron is mined and silk manufactured.

Pescadores OR FISHERS' ISLANDS. Group of islands formerly belonging to Japan. Situated in Formosa Strait, between the island of Formosa and the mainland of China, it consists of some 24 inhabited islands and 25 uninhabited rocks, all of basaltic formation, and low-lying. It covers an area of nearly 50 sq. m., and has a pop. of more than 75,000. The soil is fertile, and produces rice, millet, and other cereals. Navigation is extremely dangerous. A possession of China down to 1895, when it was ceded to Japan, the group was officially called Bokoto by the Japanese, and is known to the Chinese as Pang-hu or Peng-hu. In 1945 the group was returned to Chinese sovereignty.

Pescara. River, prov., and tn. of S. Italy, in the region of Abruzzi e Molise. The river rises in the Apennines as the Gizio and Aterno, which unite above Popoli. Below this town the river flows across the prov. N.E. to the Adriatic coast. At its mouth is an hydraulic electric power station for the supply of Rome. The town is at the mouth of the river on the coast, 8 m. N.W. of Chieti. It has a fortified harbour and is a sea-

bathing resort. Here d'Annunzio was born. Pop., with Castellammare Adriatico, with which Pescara has merged, 19,870.

During the Second Great War Pescara was occupied by Indian troops of the Allied 8th army, June 10, 1944. It suffered no damage.

Pescara, FERNANDO FRANCESCO D'AVALOS, MARQUIS OF (c. 1490–1525). Neapolitan soldier. He en-



Peshawar, Pakistan. Street scene in this city of the N.W. Frontier Province

tered the service of the emperor Charles V, and fought in the wars with the French. He took part in the battle of Ravenna, 1512, at which he was taken prisoner, and in the battle of Pavia, 1525, after which he was made commander-in-chief in Italy. He died Nov. 4, 1525. His wife was Vittoria Colonna (q.v.).

Peschiera. Town of Italy, in the prov. of Verona. It stands on the river Mincio, where it issues from the Lago di Garda, 20 m. N.N.W. of Mantua. One of the famous fortresses of the Quadrilateral (q.v.), it was captured from the Austrians by the Sardinians, May 30, 1848. *Pron.* Pesky-aira.

Pescia. City of Italy, in the prov. of Lucca. It is 23 m. by rly. W.N.W. of Florence. The cathedral, restored in 1693, has a 13th century façade and pulpit, and a fine monument to Baldassare Turini. Paper-making and silk manufacture are the leading industries, and there is trade in oil, wine, and fruit. Overrun by the Allied 5th army in the early days of Sept., 1944, it suffered only slight damage during the Second Great War. *Pron.* Pesk-ya.

Peseta. Spanish silver coin. The monetary unit of Spain, its nominal value is about 9½d. It is divided into 100 centimos and has been coined in ½, 1, 2, and 5 peseta silver pieces, and 5, 10, 20, and 25 peseta gold pieces.

Peshawar. District and capital city of the N.W. Frontier Province,

Pakistan. The dist. is a hill-girt basin, W. of the Indus, drained by the Kabul river and its tributaries, the Swat and Bara. Wheat is the chief crop. Half of the people are Pathans. The rly. follows the Kabul valley from Attock on the Indus to Peshawar, and thence to Jamrud, and a branch goes N. to Dargai at the foot of the Malakand Pass. The Lower Swat, Bara river, and Kabul river canals provide water for irrigation. Area, 1,547 sq. m. Pop. 851,833.

The town lies near the Bara, 190 m. from Kabul and 276 m. from Lahore. It occupies a strategic position in relation to the Khyber Pass, 10½ m. to the W., into Afghanistan, and is a great trade centre for raw silk and thread, silk and cotton goods, sugar, tea, etc. A broad-gauge rly. joins the town with Jamrud to the W. with Campbellpur Junction, E. of the Indus. Pop. 130,967.

Peshawar was a Buddhist capital in the 2nd century, and a great resort of Chinese pilgrims in the 5th, 6th, and 7th centuries. From the 8th century, when the Afghans first reached the district, it has been a debatable ground. Mahmud in the 11th century made it a base of operations against N.W. India. Under Jahangir and his successors Peshawar was subject to Delhi. It came into British hands at the annexation of the Punjab in 1848. It formed part of the dominion of Pakistan created Aug., 1947. *Pron.* Pesh-ah'wer.

Peshwa (Persian, leader). Title of a Marhatta chieftain. Originally applied to the chief adviser or prime minister, after the usurpation of supreme power by one of these ministers, it was given to the raja of Poona. The last Peshwa was Baji Rao, deposed by the British in 1818. *See* Mahratta.

Peso (Lat. *pensum*, weight). Monetary unit of Argentina, Chile, Mexico, Uruguay, and Colombia, originally a gold coin. The first peso was a Spanish coin, coined in both gold and silver, circulating in Spain and her colonies.

Pessimism (Lat. *peessimus*, worst). A word of modern coinage denoting, in general, the tendency to look on the worst side of things; in

philosophy, the doctrine that life and existence are fundamentally evil. From a religious point of view it reaches its extreme in Buddhism. Its chief modern representatives are Schopenhauer and von Hartmann. All satisfaction of our needs is illusory, and only leads to new needs and consequent grief; the best thing is to take no interest in life. According to Hartmann, the unconscious leads us in a direction contrary to our own interests. Progress only makes us more sensible of pain, which is part of our existence. Pleasure is only negative, pain positive. See *Pleasure; consult Le Pessimisme au 19e Siècle*, E. M. Caro, 1878; *Pessimism: a History and Criticism*, J. Sully, 1891; *Studies in Pessimism*, A. Schopenhauer, Eng. trans. T. B. Saunders, 4th ed. 1893.

Pestalozzi, JOHANN HEINRICH (1746-1827). Swiss educationist. Born at Zürich, Jan. 12, 1746, and



J. H. Pestalozzi,
Swiss educationist

educated at the university there, he became interested in social and educational reform. He wrote *The Evening Hours of a Hermit*, 1780, and the immensely successful moral tale, *Leonard and Gertrude*, the following year. During 1798-99 he conducted at Stanz, on the Lake of Lucerne, a school for orphaned children. From 1799 to 1825 he kept a school first at Berthoud and then at Yverdon, where he put into practice his educational theories, which are based on the idea that understanding is only possible by that spontaneous perception which is a result of observation. These views he expounded in *How Gertrude Teaches Her Children*, 1801. He died Feb. 17, 1827.

Pestilence (Lat. *pestilentia*, an infectious disease). Term used for any infectious deadly disease. See *Black Death*; *Plague*.

Pétain, HENRI PHILIPPE BENOÎME OMER JOSEPH (b. 1856). French soldier and statesman. Born at Cauchy-la-Tour, Pas-de-Calais, April 24, 1856, he was commissioned from St. Cyr in 1878. He passed through the École de Guerre, where he was assistant instructor under Foch in 1906, and was promoted col. in 1911, proceeding to the command of the 33rd infantry regt. When the First Great War broke out he commanded the 4th infantry bde., but before

the end of the year was placed in command of the 33rd corps, taking part in the operations in Artois, 1915. As commander of the 2nd army in 1915, he took part in the Champagne offensive, and in Feb., 1916, was placed in command of the defences of Verdun, where he displayed brilliant generalship. Placed over all the armies of the centre in Dec., 1916, he later became chief of staff, and in 1917 succeeded Nivelle in command of the armies of the north and north east. In Mar., 1918, when Foch was made Generalissimo, Pétain became c.-in-c. of the French armies, and on Nov. 19, 1918, he received the baton of a marshal of France. He was named a member of the academy of moral and political sciences in 1919, and made a member of the Académie Française in 1929.



Marshal Pétain,
French soldier

In 1920 Pétain became vice-president of the higher war council, and in that capacity directed operations against Abdel Krim in Morocco in 1925-26. Appointed inspector-general of air defences in 1931, he was in the same year made a member of the higher council of national defence. In 1934 Doumergue chose him as war minister.

A fervent R.C., right wing in politics, he was sent as ambassador to Madrid in 1939. Reynaud, the premier, recalled him May 18, 1940, to assume the office of vice-premier in the hope that the hero of Verdun would save France. But Pétain no longer believed that fighting would save her, and when Reynaud resigned, June 16, and President Lebrun called on Pétain to form a govt., he immediately made contact with Hitler through the Spanish ambassador in France, and authorised the acceptance by the plenipotentiaries he sent to Compiègne of the German armistice terms, June 22. He transferred his govt. from Bordeaux to Vichy, July 1, and there he abolished the constitution of the Third Republic, assuming the functions of head of the state. Certain of German victory, he accepted and encouraged collaboration with the Germans, although he publicly insisted that "honour" forbade France to fight against her former allies. In Sept. he designated Laval his successor, and in Oct. made him foreign

minister; but, soon mistrusting Laval, dismissed him and revoked his nomination to the succession in Dec., putting Darlan in his place. Under German pressure, however, he accepted Laval as prime minister in April, 1942.

After many hesitations, he gave the order for resistance to the Allies when they landed in N. Africa in Nov. The subsequent occupation of the whole of France by the Germans destroyed his position, and Laval's increasing power reduced him to impotence; but he refused to abdicate, and made some effort to re-establish constitutional order. This failing, by the end of 1943 he had shut himself up in his quarters in the Hôtel du Parc at Vichy, refusing to deal with Laval. When the Allies landed in Normandy, June 6, 1944, he broadcast an appeal to all Frenchmen to remain quietly at their posts. As the Allies approached Paris from the W. and Vichy from the S., the Germans tried to persuade him to leave Vichy. After persistent refusals—he wanted to surrender to the F.F.I.—he at last, Aug. 20, consented to go when the Germans threatened to shoot a hundred hostages and shell Vichy. He was taken to Belfort, and then to Sigmaringen, where he was detained until, at his own request, he was allowed, April 24, 1945, to enter Swiss territory. He crossed to the French frontier at Vallorbe, where he was arrested April 26 and interned in Fort Montrouge. Brought to trial in Paris, July 23, charged with treason, he was sentenced to death Aug. 15, the sentence being commuted two days later to life imprisonment. He was transferred to the island of Yeu, Vendée, to serve this sentence.

Petal (Gr. *petalon*, thin sheet of metal). In a flower, the inner whorl of floral leaves, the outer whorl being the green protective sepals. Petals are usually delicate, white or coloured, but may be scale-like: or sepals and petals may be alike. Collectively the petals are referred to as the corolla of the flower. They may be quite separate one from another (polypetalous corolla), or variously united to form a tube, a funnel, a bell, etc. (gamopetalous corolla). The petals are usually the most conspicuous parts of the plant, their purpose being the attraction of nectar-seeking insects to assist in the work of pollination. With this object in view the petals are frequently streaked with some stronger tint, the "honey guides." See *Flower*.

Petard (Fr. *péter*, to make an explosion). Military engine, now obsolete. It consisted of a small



Petard. Example of use of the ancient military engine, from a print of c. 1579

metal or wooden case, shaped like a half-cone, and filled with gunpowder. It was used to make a breach in a wall, or to blow in a gate when attacking a fortress. The usual procedure was to fasten it against a door or wall or any other obstacle, and then to fire it with a fuse. The man in charge of a petard was called a petardier. Its modern equivalent is the mortar (*q.v.*), but in the Second Great War a close-support tank was called the petard. It was fitted with an 8-in. mortar and carried fascines which could be laid to form a causeway across ditches screening pillboxes or other strong points. Petards were manned by the Royal Engineers. Shakespeare, in *Hamlet*, coined the phrase, "Hoist with his own petar."

Petchenegs or **PATZINAKS**. Nomadic Turkish people. Advancing from the Ural about 840, they drove the Magyars before them into Hungary, 895. In the 10th century they ruled from the Volga to the Danube, became Mahomedans, broke the power of the Chazars, and harassed the Russians. Driven from S. Russia by the Kumanians about 1047, they maintained their power in what is now Rumania until about 1100.

Peter. Masculine Christian name, from the Greek *petra*, stone or rock. It became popular throughout Christendom as that of one of the leading apostles of Jesus Christ. The French form is Pierre, and the Italian Pietro. The Spanish form is Pedro, and under that form the Spanish and Brazilian sovereigns bearing the name appear in this work.

Peter. One of the twelve apostles. A son of Jonas, apparently a native of Capernaum, he was in partnership with his brother Andrew as a fisher on the lake of Galilee when called to be an apostle. Previously, perhaps, a disciple of John the Baptist, and originally called Simon, he re-

ceived the name of Cephas or Peter from Christ, who, in reference to the meaning of the name, declared that on this rock He would build His Church. With James and John, Peter became one of the inner circle of the apostles. The story of his denial of Christ on the eve of the Crucifixion is common to all four Gospels.

Of impetuous character, eager and generous in disposition, he was a born leader of men. After the Resurrection, Christ appeared to him and gave to him the charge, Feed My sheep. He preached the first sermon after the great Pentecost, and was the first to admit a Gentile to the Christian Church. He left Antioch, where he had been working, after his dissension with S. Paul, and is believed to have preached throughout Asia Minor, to have gone to Rome, and to have met death by crucifixion, perhaps under Nero, A.D. 68. See Christian-ity; Jerusalem; Papacy.

Peter, EPISTLES OF. Two books in the New Testament written by S. Peter. Several works have survived which were ascribed to the apostle but were not in reality his. Examples are the apocryphal Gospel of Peter, the Preaching of Peter, and the Apocalypse of Peter. The question naturally arises, therefore, whether the Epistles of Peter have been rightly ascribed to him. They claim in the first verse to be written by the apostle. This claim for the First Epistle is supported by adequate external evidence. The Epistle is quoted by Polycarp and seems to have been known to Barnabas, Clement of Rome, and Papias. Its authenticity is accepted by Irenaeus, Tertullian, Origen, and Eusebius.

As for internal evidence, it has been objected that many of the ideas are Paul's rather than Peter's; that one would expect from Peter more personal reminiscences of the life of Jesus; and that the persecution referred to in chap. 4, vv. 14-16 indicates a date later than Peter's death. The first and second objections are not vital. Regarding the third, there were no doubt persecutions before the official imperial persecution of A.D. 64.

The Petrine authorship, therefore, may well be accepted, and we may conclude that the Epistle was written from Rome before 64. External evidence for the Second Epistle is weak. It is not included in the Muratorian Canon, or even in the old Latin and Syriac versions. It does not seem to have

been used by the earliest Christian Fathers; its authorship is doubted by Origen, and it is placed by Eusebius among the disputed books. See Bible; New Testament.

Peter I, THE GREAT (1672-1725). Tsar of Russia. Son of the Tsar Alexis, he was born May 30,



Peter the Great, Tsar of Russia After J. M. Nattier

1672, and succeeded to the tsardom jointly with his elder brother, Ivan, in 1682. Young Peter was trained by the Swiss, Lefort, and the Scot, Patrick Gordon. His passion for ships and for sham warfare was early indulged. In 1689 he effected a *coup d'état*, overturning the regency of his sister Sophia, though without officially deposing his brother. The same year he married Eudoxia Lopukhina. Ivan died in 1696.

A barbarian but at the same time a genius, Peter was imbued with the three conceptions of organizing his vast dominion after W. models, impregnating it with W. culture, and extending its borders to the Baltic on the N. and the Black Sea on the S. His first task was a military reconstruction directed by Gordon. A war with Turkey gave him the port of Azov, 1696, and the opportunity for creating a navy. His next step was to dispatch scions of noble families to observe and study the manners and methods of W. Europe. Peter followed this up in 1697 by himself making the great tour, visiting European courts and working with his own hands in the shipyards of Holland and at Deptford, London. He also studied anatomy and engraving. He returned to Russia to complete the suppression of a revolt raised by the party hostile to western innovations, and brought with him engineers, artisans, and scientists.

In 1699, after the accession in Sweden of Charles XII (*q.v.*), Peter formed a coalition with Poland and Denmark for a partition of the Baltic provinces of Sweden, which should establish Russia on that sea. Charles, however, crushed Denmark, shattered Peter's huge army at Narva (*q.v.*), and then turned on Poland. Peter was left at leisure to found his new capital of Petersburg, and to apply the lessons of Narva to the organization of his army. When Charles again turned upon Russia, he was drawn deep into the country, and

his army was annihilated at Poltava in 1709, though he himself escaped over the Turkish border and presently induced Turkey to declare war upon Peter. The tsar, with his army, was enticed into a trap near the Prut, and would have been annihilated but for the diplomatic skill of his mistress Catherine—afterwards his wife and successor—who procured a treaty by which Peter gave up Azov.

He now made himself master of Finland, and after the death of Charles imposed upon Sweden in 1721 the peace of Nystadt, which transferred to Russia the Baltic provinces Peter desired. Expansion S.E. at the expense of Persia was his next project, which carried the Russian borders to the Caspian and the Caucasus; but further ambitions were stayed by his death, Jan. 28, 1725. He was succeeded on the throne by Catherine I, whom he had married in 1712.

Peter's energy, which was volcanic, transformed Russia from a medieval Oriental state to a power on level terms with its Western neighbours. He altered everything, commerce, taxation, education, costume. Frequent opposition was savagely put down; even the crown prince Alexis was judicially murdered by the tsar after a quarrel. Peter never civilized himself, remaining a prey to hysterical rage, a debauchee, and in some respects a monster. But his ability was supreme, and there is no doubt that his aim transcended a mere lust for power.

Bibliography. History of the Russian Empire under Peter the Great, Voltaire, 1763; Lives, K. Waliszewski, Eng. trans. 1898; S. Graham, 1929; G. Oudard, Eng. trans. 1930; A. Tolstoi, Eng. trans. 1936.

Peter II (1715–30). Tsar of Russia. Son of Alexis, the only son of Peter the Great, he was born Oct. 11, 1715, and succeeded Catherine I in 1727. He fell under the influence of Menshikov, and exiled Anna Ivanovna, duchess of Courland, the legitimate heir to the throne. At the instigation of Dolgoruki, Peter threw off the yoke imposed on him by Menshikov, whom he sent to Siberia with his family. He died of smallpox Jan. 29, 1730.

Peter III (1728–62). Tsar of Russia. Born at Kiel, Jan. 29, 1728, he was the son of Anne, eldest daughter of Peter the Great. He ascended the throne Jan. 5, 1762, and immediately reversed Russian policy by concluding a peace with Frederick II of Prussia.

Mentally weak and never a favourite with his subjects, he was the victim of a plot not unknown to his consort, who proclaimed herself empress as Catherine II, July 14. Peter was strangled a few days later.

Peter I (1844–1921). King of Yugoslavia. Son of Alexander I, prince of Serbia, 1842–58, Peter



Peter I,
King of Yugoslavia

Karagevitch was born at Belgrade, July 11, 1844. Exiled with the rest of the family, he received a military education at St. Cyr, and fought with distinction in the foreign legion during the Franco-Prussian War, and in 1875 as a leader of Herzegovinian insurgents. He married in 1883 Zorka, daughter of Nicholas I of Montenegro.

On the extinction of the Obrenovitch dynasty by the assassination of King Alexander, June 10, 1903, Peter was elected king of Serbia by the national assembly on June 15. He was not in a strong enough position to deal justice to the murderers of his predecessor, and the new monarchy was not recognized by Great Britain until 1906. In 1914 he committed the regency to the crown prince Alexander, his second son, but was with his army early in the First Great War, accompanying it in the retreat of 1915–16 to Greece, where he spent his second exile. On the reconquest of Serbia, Peter returned to Belgrade. First sovereign of Yugoslavia, he died Aug. 16, 1921.

Peter II (b. 1923). King of Yugoslavia, 1934–45. Born Sept. 6, 1923, the son of Alexander I, he succeeded to the throne when his father was assassinated in

Marseilles, Oct. 9, 1934, and ruled under a regency headed by his uncle, Prince Paul (q.v.). Peter assumed power when he headed the revolt against the pro-Axis pact, March 25, 1941; but invading German armies forced him to flee with his government, and he took refuge in London, where in 1944 he married Princess Alexandra of Greece. Hostile to the partisan movement under Marshal Tito, he pinned his faith to Mihailovitch, and found himself at odds with the other Allied governments. Throughout 1945 no understanding could be reached between Tito and the king, and on Nov. 29 the new government in Yugoslavia formally abolished the monarchy. Peter, whom strained relations with the Allies had driven to Egypt, was in 1947 deprived of his nationality and his property was confiscated.

Peter THE HERMIT. Medieval French preacher, known for his connexion with the first crusade. He was a priest at Amiens when Pope Urban II in 1095 declared a crusade. Peter was one of the most successful wandering preachers who went through France urging its claims. He led one band of crusaders from Cologne to Constantinople, and after some vicissitudes reached the Holy Land.

He is said to have died in 1115. The medieval writers ascribe to Peter a much larger share in originating the crusade than he actually had.

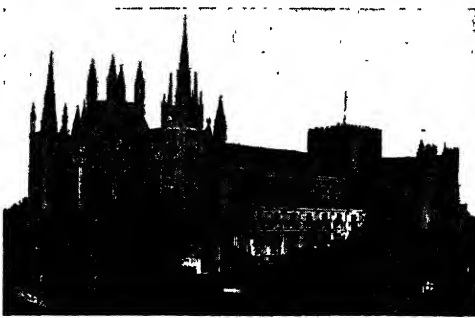


Peterborough
arms



Peter II,
King of Yugoslavia

Peterborough. City and mun. bor. of Northamptonshire, England. It stands on the Nene, 76 m. N. of London, being an important centre of main rlys. The cathedral of S. Peter occupies the site of a Saxon edifice destroyed by the Danes in 870. Another, built in Edgar's reign, was burned 1116. The third was begun c. 1118 as the



Peterborough, Northamptonshire. The cathedral of S. Peter, showing the magnificent west front

church of a monastery, took over 100 years to build, and contains examples of several styles of architecture. The magnificent west front was restored after 1895. The nave is a noble piece of work, while another feature is the 15th century "new building." Made a cathedral when a bishopric was established here in 1541, it contains the tomb of Catherine of Aragon; Mary Queen of Scots also was first interred here. There are remains of the monastery, including the cloisters, and connected with the cathedral are two gateways, (above one of which is the chapel of S. Nicholas), and the remains of the hospital of S. Thomas Becket. Other buildings include the 15th century church of S. John Baptist; the town hall, a 17th century edifice; almshouses; and a museum. New municipal buildings went up in 1928. There is a corn exchange, but the staple industry is engineering. Bricks are made in the neighbourhood.

The ancient Medeshamstede, Peterborough grew up around a Benedictine monastery founded in 655, and restored after having been destroyed by the Danes. In 1874 it was made a borough on modern lines, having previously had its medieval constitution. It was separately represented in parliament, 1547-1918, and from 1950 gave its name to a co. constituency. The diocese covers the co. of Northampton. Mkt. days, Wed. and Sat. Pop. est. 51,920.

The soke of Peterborough, a district around the city, forms a separate county for administrative purposes. It has an area of 83½ sq. m. Pop. est. 60,877.

Peterborough. Town of Dalhousie co., S. Australia. It is near Terowie, the rly. junction of the line from Broken Hill to Port Pirie and the main line from Adelaide to Perth. Formerly called Petersburg, it has a pop. of 3,059.

Peterborough. City of Ontario, Canada. It stands on the river Otonabee, 75 m. N.E. of Toronto, and is served by the C.N.R., C.P.R., and the Trent Canal. Its public buildings include an R.C. cathedral. It owns the gas, light, water, and power plants, and is the headquarters of the Canadian General Electric Co. Pop. 25,350.

Peterborough, CHARLES MORDAUNT, 3RD EARL OF (1658-1735). English sailor and soldier. Son of John, Viscount Mordaunt (1627-75), he entered the navy in 1675. He proposed the invasion of England to William of Orange and helped to set that prince on the

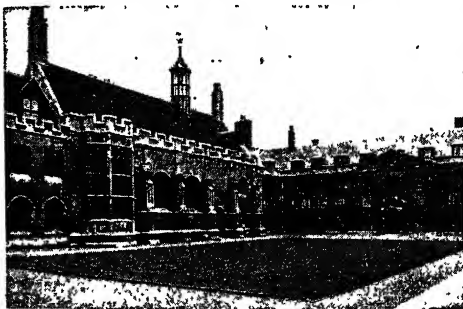
throne. He was rewarded with the post of first lord of the Treasury, and the earldom of Monmouth, 1689. In connexion with the Fenwick plot he was kept in the Tower for three months, 1697, but that year inherited the earldom of Peterborough. In 1705 he



3rd Earl of Peterborough

shared the command of the Spanish expedition with Shovell. A campaign in E. Spain, including the capture of Barcelona, though represented by himself as brilliantly successful, roused much controversy. Recalled in 1707, he went to Vienna as ambassador in 1710, returning on the accession of George I in 1714, when his official career ended. He lived until Oct. 25, 1735.

Peterculter. Village and parish of Aberdeenshire, Scotland. Also called Culter, it stands on Culter Burn at its junction with the Dee, 7½ m. by rly. S.W. of Aberdeen. Paper making is the chief occupation of a population of 2,000.



Peterhouse, Cambridge. The quadrangle and hall
Country Life

Peter Grimes. First opera by Benjamin Britten, with libretto by Montagu Slater. It is based on an episode in Crabbe's *The Borough*, a poem describing the life of the fishing community at Aldeburgh, Suffolk, in the early 19th century. It was first produced at Sadler's Wells, London, June 7, 1945.

Peterhead. Municipal burgh and seaport of Aberdeenshire, Scotland. The most easterly town in the country, it stands on Peterhead Bay, 34 m. N.N.E. of Aberdeen, with a rly. station. The burgh is in two parts, Peterhead proper and Keith Inch, connected by swing bridge. The harbours include a graving dock

and a patent slipway; a large harbour of refuge in Peterhead Bay was built from 1886 to 1921 by convicts, and work to extend the breakwaters is proceeding by the same labour. The chief industry is the herring fishery, but since 1945 white fishing has rapidly expanded. Peterhead, long the property of the Keith family, was founded and made a burgh in 1593 by George, Earl Marischal. At one time it was the headquarters for the Arctic fisheries. Pop. approx. 13,000.

Peterhouse OR **S. PETER'S COLLEGE.** Oldest college of Cambridge university. It was founded c. 1257 by Hugo de Balsham, bishop of Ely; its charter, on the lines of Merton College, Oxford, is dated 1284. The principal court assumed quadrangular form in the 15th century; the N. range was begun in 1424, and in 1431 a library was planned, of which three windows and the newel-stair survive.

The existing chapel, consecrated in 1632 and designed by Matthew Wren, master, 1625-34, and uncle of the architect Christopher Wren, contains specimens of Munich glass. Cardinal Beaufort, Andrew Perne, Fynes Moryson, John Cosin, Richard Crashaw, Isaac Barrow, Thomas Gray, Lord Kelvin, James Dewar, and A. W. Ward are famous names in the records of the college, which is under a master.

Peterlee. In March 1948 a Peterlee Devpt. Corp. was set up by the Ministry of Town and Country Planning to establish a new town at Easington, Co. Durham, which would house a mining pop. of 30,000. The name Peter Lee was that of a miner who became the first Labour chairman of any county council.

Peterloo OR **THE MANCHESTER MASSACRE.** Name popularly given to an encounter between soldiery and people at St. Peter's Field, Manchester, England, Aug. 16, 1819. It was applied in derision, the battle of Waterloo being still fresh in the public mind. Some 60,000 people had assembled



Peterhouse College arms

for a demonstration in favour of parliamentary reform, and the police, by order of the magistrates, attempted to arrest their leader, "Orator" Hunt. This proving impossible, yeomanry appeared, and finally the magistrate ordered hussars to charge the crowd, with the result that eleven were killed and about 500 injured. The Free Trade Hall stands on the site. *See* Industrial Revolution.

Peter Martyr (1205–52). Italian saint. He was born at Verona, and at the age of 15, admitted, by S. Dominic, to his order. He conducted missions with great success throughout Italy and, appointed in 1232 head of the Inquisition, is said to have acted with greater zeal than mercy. He was murdered while returning from Como to Milan in 1252, and canonised in 1253.

Peter Martyr (1500–62). Italian Protestant reformer, whose surname was Vermigli. Born at Florence, May 8, 1500, he became abbot of an Augustinian monastery at Spoleto and principal of a college at Naples. Turning Protestant, he had to flee to Zürich in 1542, and became professor of theology at Strasbourg. Visiting England in 1547, he was appointed professor of theology at Oxford. On the accession of Mary he returned to Strasbourg, and later became a teacher of Hebrew at Zürich, where he died Nov. 12, 1562.

Peter Pan. Fairy story character invented by J. M. Barrie, and famous as the boy who never

grew up. He first appeared in the closing chapters of *The Little White Bird*, 1902, which describes his adventures in Kensington Gardens. The children's play, *Peter Pan*, was produced at the Duke of York's Theatre, London, Dec. 27, 1904. This depicts the adventures of a group of children who visit the Never-Never Land under the guidance of Peter, meeting with fairies, pirates, and Red Indians. The play is among London's most regular Christmas revivals, and actresses who have played the part of Peter, since it was first portrayed by Nina Boucicault, have included Cissie Loftus, Pauline Chase (1906–13 revivals inclusive), Madge Titheradge, Edna Best, Elsa Lanchester, Jean Forbes-Robertson, Nova Pilbeam, and Phyllis Calvert. A story version of the play, *Peter and Wendy*, was published in 1911.

In Kensington Gardens a bronze statue of Peter Pan, by Sir George Frampton, the gift of Barrie himself, was set up (as a surprise) close to the Long Water in 1912.

Peter Plymley's Letters. A series of ten letters by Sydney Smith (*q.v.*). It was published in 1807 and 1808 with the full title of *Letters on the Subject of the Catholics to my Brother Abraham who lives in the Country*, by Peter Plymley. The letters, full of scathing wit and searching irony, were appeals for the removal of the civil disabilities of the R.Cs.

Peter Rabbit. Animal character in children's books, written and illustrated by Beatrix Potter (*q.v.*). The *Tale of Peter Rabbit* appeared in 1902, the first of a series of little picture books, mainly about animals, which have charmed children ever since, and are often called the *Peter Rabbit* books, although this character appears in only a few of them.

Peters, Hugh (1598–1660). English divine. Educated at Trinity College, Cambridge, he began his career as a lay preacher, but was subsequently ordained and appointed to S. Sepulchre's, London. He settled in Holland about 1629, and became an Independent. In 1635 he went to New England, where he was one of the leading ministers at Salem. Sent to England in 1641 on colonial business, he served as an army chaplain during the Civil War. At the Restoration he was tried for complicity in the death of Charles I, and executed, Oct. 16, 1660.

Peters, Karl (1856–1918). German administrator. Born at Neuhäus, he was educated at Göttingen, Tübingen, and Berlin, and in

1884 went to Zanzibar to organize a German colonial scheme. He secured treaties with native chiefs, and in 1885 returned to Berlin to get them approved, founding a German East African company. In 1891 he was administrator for Germany in E. Africa, but was deprived of his rank in 1891 for cruelty to the natives. Reappointed in 1906, he died at Woltorf, Brunswick, Sept. 12, 1918.

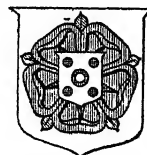
Peters, Matthew William (1742–1814). English painter. Born in the Isle of Wight, he studied at the Dublin school of design. He began to exhibit at the Academy in 1769, became A.R.A. in 1771, and R.A. in 1777. His paintings were chiefly portraits, several of which were engraved by Bartolozzi and J. R. Smith. In 1783 he took holy orders, ultimately becoming a prebendary of Lincoln Cathedral, but continued his work as an artist. Peters died at Brasted, Kent, March 20, 1814.

Petersburg. City of Virginia, U.S.A. It stands on the Appomattox river, at the head of navigation, 24 m. S. of Richmond, and is served by rlys. and by the Appomattox canal. Manufactures include tobacco, cotton, machinery, and silk goods, and there is a trade in timber. Petersburg was laid out in 1733, incorporated in 1748, and chartered as a city in 1850. The first negro congressman, J. M. Langston, was elected by this city in 1888. Pop. 30,631.

Petersburg, SIEGE OF. Concluding phase of the American Civil War, 1864–65. In June, 1864, the town of Petersburg (*v.s.*) was held by a Confederate force of 2,500 men. Recognizing that its possession would place Richmond in his hands, Grant assaulted the place, June 16–18, but was repulsed with heavy losses. The siege which followed was signalled by great valour on the Confederate side, but Lee was eventually reduced to evacuate Petersburg and Richmond, April 2, 1865. Seven days later he surrendered to Grant at Appomattox Court House.

Petersfield. Urban dist. and market town of Hampshire, England. It is 19 m. N.N.E. of Portsmouth, with which it has rly. connexion. The chief building is

the church of S. Peter, partly Norman, and there is a town hall. In the market place is an equestrian statue of William III. Near the town



Petersfield arms



Peter Pan. The bronze statue by Sir George Frampton, R.A., in Kensington Gardens, London

is Bedales school, conducted on co-educational lines. Petersfield was a borough with a merchant

Croatia-Slavonia. It stands on the right bank of the Danube opposite Novi Sad (Neusatz), with which it is connected by two bridges, and is 49 m. by rly. from Belgrade and 174 m. from Budapest.

Pethick-Lawrence, **FREDERICK WILLIAM PETHICK-LAWRENCE**, 1ST BARON (b. 1871). British politician. Born Lawrence, Dec. 28, 1871, he went from Eton to Trinity College, Cambridge, and was 4th wrangler in 1894. He was

editor of *The Echo*, 1902-05; of the *Labour Record and Review*, 1905-07; and, jointly, of *Votes for Women*, 1907-14. In 1901 he married a leading feminist, Emmeline Pethick, and added her surname to his own. His activities on behalf of woman suffrage brought him nine months' im-

prison compound possessing antispasmodic and analgesic properties. Colourless, crystalline, and neutral in reaction, the compound is used in surgery, obstetrics, and for pain in illness or injury.

Petiole (Lat. *petiolus*, stalk or little foot). Stalk of a leaf, continued through the blade as the midrib. A strand of vascular tissue runs through it, by which water from the roots is conducted to the leaf-blade. The upper surface is frequently grooved, and the lower surface may be ridged. In leaves that possess the power of movement, independently of wind, the petiole is swollen at its base into a pulvinus or motile organ. This may be seen in the scarlet runner, which lowers its leaves and leaflets at night. The constant wind movement of aspen and other poplar leaves is due to the lateral flattening of the petiole. In clematis and tropaeolum the petiole twists round any available support, thus enabling the plant to climb. See Leaf.

Pétion de Villeneuve, JÉRÔME (1756-94). French revolutionary. Born at Chartres, he was elected to the states-general, 1789, becoming president of the Assembly, 1790, and mayor of Paris in Nov., 1791. He became first president of the national convention, but a quarrel with Robespierre led to his proscription. He joined the Girondists, and after an unsuccessful attempt at Caen to raise a Norman insurrection he fled into the Gironde, and in June, 1794, his body was found near St. Emilion.

Petition (Lat. *petere*, to seek). Term used for a request, generally one from an inferior to a superior. The word appears much in English history. The right of petitioning the king was claimed at an early date and was established in the time of Henry IV, the reason for this insistence being that many evils could be redressed only by the personal action of the sovereign. In 1689 the right of subjects to petition the king was laid down in the Bill of Rights. Until the time of Henry VII, legislation was usually based on petition, the laws being drafted by the judges from the petitions received. The crown still receives certain petitions.

The modern petition is usually to one of the houses of parliament, generally the commons. This became a frequent practice in the time of Charles I, and petitions are still presented, urging members to act in a certain way. To protect itself from violence, parliament enacted, in 1662, that not more than ten persons shall present a



Petersfield, Hampshire. Market place and parish church of St. Peter, showing equestrian statue of William III

guld in the 12th century, and later a centre of the cloth industry. From 1553 to 1885 it was separately represented in parliament, and from 1950 gave its name to a co. constituency. Annual fairs are held. Market day, Wed. Pop. 6,700.

Petersham. Parish and village of Surrey, England. Part of the bor. of Richmond, and called in Domesday Patricesham, Peter's Dwelling, Petersham once belonged to the abbey of S. Peter, Chertsey, and had a fishery of eels and lampreys. Passing to the crown in 1415, the manor was granted, with Ham (*q.v.*), in 1672, to John, duke of Lauderdale, and later to the earl of Dysart. The church of S. Peter, founded 1505, but mainly dating from 1790, has interesting monuments. In the churchyard are the graves of Mary and Agnes Berry, Horace Walpole's "Elder-Berries," and Vancouver, the explorer.

Peter's Pence. Tax levied in England by the pope from the 8th or 9th century, and subsequently extended to other countries. It was originally called Róm-feoh or Rome scot, and amounted to a silver penny per hearth. It was withheld by England in 1386 in order to bring pressure to bear on the pope to agree to the statute of praemunire, and was abolished by Henry VIII, 1534, though it has been since revived as a voluntary contribution by Roman Catholics.

Peter the Great Bay (Victoria Bay). Inlet of the Sea of Japan, on the S. side of the Russian Maritime Province in Eastern Siberia. It is 90 m. wide, extends 50 m. inland, and contains six bays and several small islands. The chief port is Vladivostok, which is situated on the Muraviev peninsula.

Petervarad, PETERVARDEN, OR PETROVARADIN. Town of Yugoslavia, in the Syrmia dist. of



Lord Pethick-Lawrence, British politician, and Lady Pethick-Lawrence, a prominent suffragist

prisonment for conspiracy in 1912. A pacifist, during the First Great War he advocated peace by negotiation. He was elected to the house of commons in 1923, and was Labour member for East Leicester until 1931, when he lost his seat. Returned for East Edinburgh in 1935, he became a privy councillor in 1937. In the 1929 Labour administration he was financial secretary to the Treasury, and was a member of the Indian round-table conference in 1931. Secretary of state for India, 1945, with a seat in the house of lords, he played an important part in the negotiations for Indian independence. He resigned in April, 1947. He wrote widely on industrial questions, including *This Gold Crisis*, 1931; *The Money Muddle and the Way Out*, 1933; also an autobiography, *Fate Has Been Kind*, 1943.

Pethidine. Synthetic compound introduced in 1939 as a hydrochloride. It is a piperidine

petition. Many legal proceedings—e.g. for divorce—are also begun by petition. See Commons, House of; Parliament.

Petition of Right. In English law, the only method of enforcing claims against the crown until the Crown Proceedings Act of 1947 abolished such petitions and enabled the crown to be sued in the courts in the ordinary way. A petition of right could not be brought for a tort, as the crown was not liable for this, but it was used to enforce contracts or recover property. The petition was presented, and on the attorney-general granting his fiat—"Let right be done"—the proceedings continued almost exactly as in an action between ordinary litigants.

Petition of Right. Statement of constitutional claims presented to Charles I. Having during the first three years of his reign raised money without consent of parliament, and done other arbitrary acts, Charles I encountered a stiff resistance when in 1628 he called his third parliament. Wentworth, Pym, and others drew up the Petition of Right, which passed through both houses, and was signed by the king on June 7. By signing it Charles promised never again to raise money without consent of parliament or to imprison anyone for refusing to pay an illegal tax; not to billet soldiers in private houses, or put martial law into operation. The Petition of Right is frequently confused with the Bill of Rights of 1689.

The Humble Petition and Advice was the name given to an address presented to Cromwell in 1657, urging him to accept the crown and suggesting certain changes in the constitution. See Forced Loan.

Petitio principii (Lat., begging the question). In logic, the fallacy of assuming what is to be proved as the premise of a syllogism, or making use of a premise, the truth of which is not admitted. An instance of this is Aristotle's argument: All bodies tend towards the centre of the universe; all bodies tend towards the earth; therefore the earth is the centre of the universe. How can it be affirmed that all bodies tend towards the centre of the universe, without assuming what it is desired to prove, viz. that the earth is that centre? It is akin to arguing in a circle, or using a premise to establish a conclusion and then proving the premise by the same conclusion. See Logic.

Petit Journal, L^e. Paris morning newspaper, established Feb. 2, 1863, and the pioneer of the popular press in France. By 1917 its circulation exceeded 1,250,000. In 1889 Le Petit Journal started a weekly illustrated supplement in colours, and in 1896 the weekly Petit Journal Agricole and Le Petit Journal Illustré de la Jeunesse. It ceased after the liberation of France in 1944.

Petit Mal. Mild form of epilepsy, not associated with convulsions. It may follow head injuries or war wounds. The condition is characterised by sudden short attacks of unconsciousness, or complete oblivion to the surroundings. The patient does not know he has had the attack, and during it may have performed unusual acts. The condition may last for years or pass into ordinary epilepsy with convulsions. The patient should live a careful life and not follow any occupation which would be dangerous in the event of an attack coming on.

Petit Marseilles, L^e. Daily paper of S.E. France. It was founded in 1868, and eventually achieved a circulation of 500,000. It was moderately Right in political trend. After the liberation of France in 1944 it ceased.

Petit Parisien, L^e. A Paris daily newspaper, founded in 1876. Its circulation, 300,000 in 1888, had by 1917 reached over 2,500,000. It took up no strong political attitude, but relied for popularity upon serial stories and other features. It was suppressed after the liberation of France 1944 on the grounds of collaboration with the Germans during the occupation of France in the Second Great War.

Petkov, NIKOLA (1889-1947). A Bulgarian politician. He was born near Sofia, and entered politics at an early age. After the First Great War he emerged as a leader of the Peasant party. In Sept., 1944, he was one of the signatories of the armistice whereby Bulgaria agreed to fight on the Allied side. A month later he joined the cabinet as vice-premier, but in 1945 resigned. He then headed the opposition to the Communist-dominated government, being arrested in 1947. Accused of planning a *coup d'état*, he was hanged Sept. 23.

P.E.T.N. Abbreviation for Pentaerythritoltetranitrate $C(CH_2ONO_2)_4$, a high explosive extensively developed for military purposes during the Second Great War. Being sensitive to impact, it is used only in admixture with a

less sensitive explosive such as T.N.T. or with a wax. It was employed by the Germans as a priming charge for H.E. bombs, and as the explosive charge of the explosive incendiary bomb. It is made by the direct nitration of pentaerythritol; the latter is prepared by condensing formaldehyde and acetaldehyde in the presence of slaked lime.

Peto, SIR SAMUEL MORTON (1809-89). British contractor and politician. Born at Woking, Aug.



Sir Samuel Peto, British politician

4, 1809, he inherited in 1830 a share in his uncle's business, built the Reform and several other London clubs, and the Nelson Column. In 1846 he founded the firm of Peto and Betts, which constructed rail-

ways in many countries. He entered parliament in 1847, and was made a baronet in 1855. In 1866 financial disaster overtook his firm, which was obliged to suspend payment. Peto gave up his seat in parliament, and passed the rest of his life in retirement, dying Nov. 13, 1889.

Petőfi, SANDOR (1823-49). Hungarian poet. He was born at Kis Kőrös, Jan. 1, 1823. In 1844 he brought out a volume of poems which procured him fame. In 1848, having served the revolutionary cause as poet, orator, and journalist, he joined the Hungarian army, becoming captain and aide-de-camp to Bem.



Sandor Petöfi, Hungarian poet

He fell at the battle of Segesvár, July 31, 1849. A leader of the Romantics, he wrote fine epics like János Vitéz and The Apostle; but his fame rests on shorter poems of love and war, and he is generally regarded as the greatest Hungarian lyrical poet. Sir John Bowring translated his best poems, 1866.

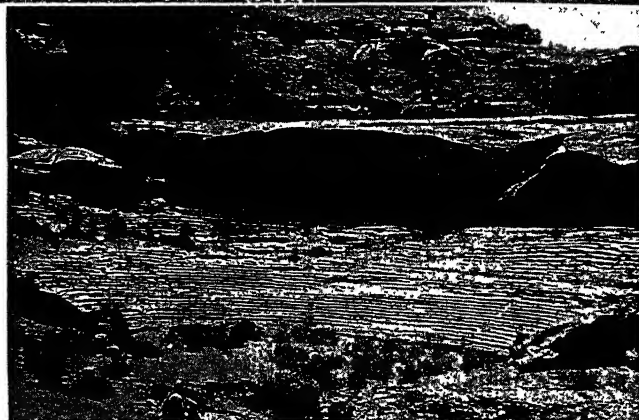
Petone. Suburb of Wellington, New Zealand. Standing on Port Nicholson, it has government rly. works, large refrigerating works, and woollen mills. The first settlement was made in 1840.



Petra (Gr., rock). Ruined capital of the Nabataeans. Known also as Sela, Joktheel, or Reqem, it lies under Mount Hor, 56 m. S. of the Dead Sea, in Transjordan. An extraordinary gorge leads to a masterpiece of Greek art, the Khazne Fir'aoun, a rose-red temple with graceful columns, and sculptures of winged war-maidens, Arab warhorses, and war dances. Beyond is a mountain-ringed oval space, about one mile long and $\frac{1}{2}$ m. broad.

Here stood the vanished city of Petra, which is represented by thousands of rock tombs, ranged in tiers on the iridescent sandstone flanks of encircling mountains. Royal tomb fronts, rising to 65 ft., with decorated windows, large sculptured porches, and two or three storeys of pillars, copy the lost palaces. In noble mansions of death survive the dwelling-places of merchant princes, and square cottages of commoners are represented by small, plain-fronted tombs. In the oldest work, pylons indicate Egyptian influence; later carving shows connexion with Persian art. The Syrian arch is used, and the finest works are in Greco-Roman style, dating from the Augustan age.

As an Edom stronghold, Petra was carried with immense slaughter by the Judeans, under Amaziah, in the 9th century B.C. In Assyrian and Babylonian invasions it became the refuge of the Nabataeans. They used the valley as a burial place and treasure store, and it was raided in 312 B.C. by Macedonians, and later by Pompey's Romans. But the nomads held the desert line from Damascus to the Red Sea, controlling most of the commerce between the Indian Ocean and the Mediterranean. Winning the favour of Augustus by a victory over Cleopatra's Red Sea fleet, they completed their practical monopoly of the trade of the Orient.



Petra, the rock city of Edom. 1. Temple of El-Deir, hewn from the living rock. 2. Tomb of the Three Storeys, the largest sepulchral monument. 3. Rock-hewn building called the Treasury. 4. Theatre, cut out of the cliff, with 33 tiers of seats, accommodating 3,000 spectators

In A.D. 105 Trajan captured the city. What he wanted was its wealth and trade. All he obtained was the shell of it, for the Nabataeans shifted their commerce to Palmyra (*q.v.*). Treasure hunters began to break into tombs, and Saracens of the 7th century A.D. wrecked the town in search of buried spoil. In addition to the empty funeral caves, little remains, even in ruin, except the temple in the gorge, a great amphitheatre, and the wreck of a colossal classic temple on the mountain top of El-Deir. In the First Great War Petra was used as a base by Col. T. E. Lawrence (*q.v.*), in his attack on the rly. and the 4th Turkish army.

Bibliography. Petra, Perea, Phoenicia, A. Forder, 1923; Petra: its History and Monuments, Sir A. Kennedy, 1925.

Petrarch (Ital. *Petrarca*) (1304-74). Italian poet and humanist. Son of a notary, who was exiled with Dante from Florence, he was born at Arezzo, Tuscany, July 20, 1304. Christened Francesco, he

changed his family name of Petrarco to Petrarca. Taken to Avignon at the age of nine, he was educated there, at Montpellier, and at Bologna. He early displayed a love for the classics, but studied for the law, which, after his father's death in 1326, he abandoned for letters.

He took minor orders, found generous patrons, particularly in the Roman house of Colonna, and won the friendship of Azzo di Correggio. In 1327, in the church of S. Clara, Avignon, he first saw the Laura who inspired his muse, and "made to bud forth with the noblest sentiments all the seeds of virtue which nature had sowed in his heart." This lady, to whom he addressed some 300 sonnets, has been doubtfully identified with Laura di Noves, the wife of Hugo de Sade. She was the mother of eleven children when she died of the plague in 1348.

While pursuing ardently his Latin studies, the writings of Cicero, Virgil, Livy, and Seneca, and regarded by his younger

literary contemporaries as their leader, he took a deep and constant interest in public affairs. He travelled in France, Germany, and the Netherlands. Kings and popes competed for his society, he was induced to undertake important public missions, and in letters to rulers and public men he endeavoured to influence their policy to the advantage of his native country. He wrote a treatise on government, and in 1351 his advice was sought in the drafting of a constitution for Rome, in which city, on Easter Sunday, 1341, he had been crowned poet laureate. He disliked Avignon, then the seat of the papal court, and found a congenial retreat at Vaucluse, which he left finally in 1353 for Milan, Venice, and Arqua, since called Arqua Petrarca, a village on the S.E. of the Euganean Hills, near Padua, where he died July 18, 1374.

Petrarch has been called the first of the moderns. A scholar at a time when all books were in MS., and texts were at the mercy of the copyists against whom he declaimed, his fame soon became universal in Europe, largely through his sonnets and other poems, which were written in Italian, and exerted a lasting influence on the love poetry of France and England.

The spiritual and mystical side of his character was in curious contrast to his literary paganism. As



Petrarch. Italian poet, and first of the humanists

a poet he possessed an acute sense of melody, of the beautiful in expression. The first to popularise the sonnet, he set chief store by his Latin works, especially his unfinished epic, *Africa*, which has Scipio Africanus as hero, and his *De Viris Illustribus*, or *Lives of Famous Men*. His letters, of which he kept copies, throw light

on the intellectual life of his time; his dialogues are remarkable for their self-revelation. His friends included Boccaccio, whose story of *Griselda* he translated into Latin. Petrarch, to quote Villari, was the first to write freely of all things in the same way as a man speaks.

Consult Lives, H. C. Holloway-Calthrop, 1907, E. Tatham, 1925-26; also Francesco Petrarch, Poet and Humanist, M. F. Jerrold, 1909; Petrarch, the first Modern Scholar and Man of Letters, J. H. Robinson and H. W. Relfe, 1914; Petrarch Bibliogr., D. W. Fiske, 1915.



Petrel. Storm petrel, *Thalassidroma pelagica*, or Mother Carey's Chicken, of the North Atlantic Ocean

Petrel (Dim. of Peter, from some species appearing to walk on the water). General name for about 100 species of oceanic birds, constituting the order Tubinares. It includes the albatross, diving petrels (*Pelecanoides*), storm petrels (*Procellaria*), flat-billed P. (*Prion*), fulmar P. (*Fulmarus*), and the shearwater P. (*Puffinus*). All have a rudimentary hinder toe, hooked bill, and tubular nostrils. They nest in burrows or rock-clefts, and lay a single egg. The name indicates more particularly the storm petrel, or Mother Carey's chicken (*Thalassidroma pelagica*), which breeds in the U.K., chiefly in Scotland and Ireland, and is found in the N. Atlantic, though it does not nest on the American side. It is a swallow-like black bird, with a patch of white in front of the tail. Normally subsisting upon small surface animals, it often follows, and alights upon, ships to pick up scraps.

Petrie, Sir Charles Alexander (b. 1895). British historian. Born Sept. 28, 1895, he succeeded his brother as 3rd baronet in 1927. He was foreign editor of the *English Review*, 1931-37, editor of the *Empire Review*, 1941-43, and managing editor of the *New English Review* from 1945. Director of a publishing firm, he was honoured by the Spanish, Italian, and Greek governments, and was a corresponding member of the Royal Spanish Academy of History. He wrote *Mussolini*, 1931; *The Jacobite Movement*, 1932; *History of*

Spain (with L. Bertrand), 1934; *The Four Georges*, 1935; *The Stuarts*, 1937; *Life and Letters of Sir A. Chamberlain*, 1939-40; *Diplomatic History*, 1713-1933, 1946. *Proton. Petree*.

Petrie, George (1790-1866). Irish antiquary, born in Dublin. He became a Royal Hibernian Academician and painter of Irish scenery and remains. His *Essay on Round Towers* received the Irish Academy prize, 1830. *Antiquities of Tara Hill*, 1839; *Ecclesiastical Architecture of Ireland*, 1845; and *Ancient Music of Ireland*, 1855, represent researches facilitated by his superintendence of the antiquarian section of the Ordnance Survey of Ireland, 1833-46. After his death, Jan. 17, 1866, his collections were acquired for the Dublin museum.

Petrie, Sir (William Matthew) Flinders (1853-1942). English archaeologist. He was born at Charlton, June 3, 1853. During 1875-80 he surveyed Stonehenge and ancient British earthworks and, applying similar methods to the pyramids of Gizeh, began a series of excavations in Egypt which lasted until 1924, making valuable discoveries at Naucratis, Daphnae, Coptos, Nagada, Abydos, Amarna, Memphis, and Tarkhan. In 1927 he went to Palestine, and was excavating there and in Syria until 1938. He was professor of Egyptology at University College, London, 1892-1933, then emeritus professor; he founded the Egyptian Research Account which in 1905 was enlarged as the British School of Archaeology in Egypt. By a lifetime devoted to patient fieldwork, and by great interpretative ability, Petrie established himself as the outstanding Egyptologist of his time. Knighted in 1923, he died in Jerusalem, July 28, 1942. Besides books covering the whole field of Egyptology, he published *Revolutions of Civilization*, 1911; *Eastern Exploration*, 1918; *Some Sources of Human History*, 1919; *Palestine and Israel*, 1934; also an autobiography, *Seventy Years in Archaeology*, 1931. *See Egypt*.

Petrograd. Former name of the Russian city of Leningrad (*q.v.*). Tsar Nicholas II changed the name of his capital in 1915 from the German (and erroneous) form St. Petersburg to the Russian form Petrograd (city of Peter, after its founder Peter the Great) following the outbreak of war with Germany. It retained this name until 1924, when after the death of Lenin it was renamed Leningrad.

PETROLEUM: ORIGIN AND SOURCES

S. E. Coomber, Lecturer in Oil Technology, Imp. Coll. of Science

An explanation of the probable origin of petroleum is followed by an account of its sources and how they are tapped. Details regarding the products of petroleum will be found under their names, e.g. Kerosine; Gasoline; Naphtha. See also Air Lift; Asphalt; Cracking; Fractionation, etc.

Petroleum (Lat. *petra*, rock; *oleum*, oil) is the name given to certain hydrocarbons which occur naturally in the earth's crust and which may be gaseous (natural gas), liquid (crude oil), or solid (asphalt, ozokerite). Hand-dug shafts, the basis of small local industries in Burma and Europe, date back several centuries, but the systematic exploitation of petroleum by borings began with the first oilwell drilled by Drake in the U.S.A. in 1859. The exploitation of natural asphalt which occurs by itself (pitch lakes) or as impregnations (asphaltic limestone, asphaltic sandstone) is a separate industry.

Petroleum has a complex chemical constitution. It is a physical mixture of a vast number of hydrocarbons belonging to three groups, the paraffins, the naphthenes, and the aromatics; it includes also small proportions of oxygen-, nitrogen-, and sulphur-bearing compounds, which are most abundant in asphalts, and asphaltic oils.

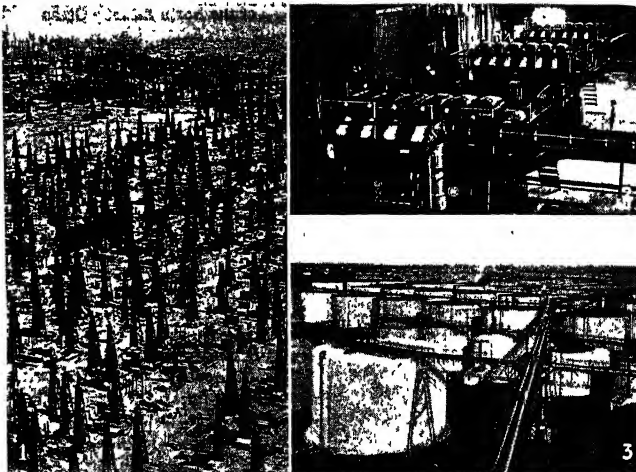
Crude oil is found in pores and fissures of permeable strata which, with few exceptions, are sands and sandstones or limestones. It is associated with natural gas and brine. The origin of petroleum and the mechanism of its accumulation are not fully understood. Chemical, physical, biological, and geological considerations suggest that it may be derived from small forms of life entombed in marine or estuarine sediments and prevented from normal decay by lack of oxygen. Biochemical processes undoubtedly play an important part in the transformation which must then take place. Forces due to compaction, buoyancy, and interfacial and surface tensions cause the minute globules of petroleum, disseminated throughout the muddy sediment in which they were formed, to be concentrated in the coarser strata. Subsequent earth movements which tilt or fold the strata lead to further concentration in the upper parts of the structures so produced. If, after this final concentration, the cover of impermeable rock (cap rock) should be pierced, oil and gas will escape to the surface and form a seepage. Inspissation of seepage oils which are asphaltic leads to

the formation of solid asphalt deposits, some of which are called pitch lakes.

No method, other than drilling, has yet been devised whereby petroleum in its subterranean reservoir rock can with certainty be detected from the surface. The most that the petroleum geologist can do is to point out geological structures in which oil might well be found; they must then be drilled to see if it is there. His conclusions are based on a detailed study of the geological history and types of sedimentary rock in the area. Once the more obvious structures had been found and tested, the petroleum geologist made more and more use of geophysical methods of prospecting.

Oil moves through the reservoir rock by reason of gas pressure, water pressure, or both. Sometimes this is sufficient also to lift the oil to the surface (flowing production), but natural pressure declines until flow can no longer be maintained; most wells never flow unaided. The type of artificial lift used depends on the productivity and depth of the well. When productivity is high, gas-lift is installed; if production is moderate or low some form of plunger pump is used; most wells are pumped in their last stages of usefulness. The total recovery of oil from the reservoir is usually 50-70 p.c. of the quantity originally present; the theoretical maximum is some 80 p.c. Before the importance of production control was realized and the technique mastered, many fields were abandoned after recovery of 25 p.c.

Oil leaving the well is accompanied by natural gas, partly free and partly in solution. There may



Petroleum. 1. Part of the vast oilfield at Signal Hill, California. 2. The pumping station at Haifa, Palestine, terminus of the pipe line from the Iraq oilfields. 3. Oil storage tanks at Constanza, Rumania

After the discovery of oil additional wells are drilled to outline the gas-oil and oil-water contacts and provide data on reservoir conditions, the further development of the field being based on this information. It is general practice to drill wells by the rotary method, beginning with a diam. of 15-20 ins. and finishing with one of 6-12 ins. Oil was obtained in 1947 from a well approx. 14,000 ft. deep. The wells are lined with steel tubes (casing) which are cemented in place and fitted at the top with a system of control valves called a christmas-tree.

also be water, free or emulsified with the oil. Various devices are therefore necessary to free the oil from gas and water. The separated gas is used for gas-lift, for carbon black manufacture, for fuel, or for return to the reservoir to maintain pressure. The oil goes to storage tanks and thence to the refinery. When the quantities are relatively small transport may be by road or rail cars; usually pipelines are used. Sea transport is by tanker.

REFINING AND MARKETING. Crude oil cannot be used without preliminary treatment. In the refinery it is split into a number

ANNUAL WORLD CRUDE OIL PRODUCTION SINCE 1860

Production figures given in thousands of barrels; annual productions of less than 1,000 barrels not included.

	1860	1870	1880	1890	1900	1910	1920	1925	1930	1935	1940	1945
Poland.. ..			229	659	2,347	12,673	5,607	5,960	4,904	3,812	3,891	750
Rumania .. .	9	84	115	383	1,629	9,724	7,435	16,650	41,624	61,310	42,644	34,772
Austria .. .										44	2,480	3,074
Czecho-Slovakia ..							69	158	157	133	163	170
Hungary .. .											1,755	5,018
*Germany .. .			9	108	358	1,032	248	541	1,182	2,996	4,544	3,800
*France .. .							356	459	523	541	496	197
Italy .. .			2	3	12	51	35	61	59	119	57	75
Albania .. .										41	1,497	267
United Kingdom ..							3	3			124	532
U.S.S.R. .. .		204	3,001	28,691	75,780	70,337	25,430	52,535	127,360	184,931	220,600	154,953
Bahrain .. .										1,265	7,074	7,309
Saudi Arabia .. .											5,365	21,311
Iraq .. .											24,225	35,112
Persia .. .							12,230	35,038	45,828	27,408	24,225	130,526
Burma and India ..				118	1,079	6,138	8,375	8,274	8,292	9,219	10,033	3,068
East Indies .. .					2,253	11,031	18,549	25,679	46,636	52,717	69,058	9,700
Japan .. .			26	52	871	1,829	2,231	1,915	1,950	2,249	2,639	1,521
China .. .											10	484
Egypt .. .							1,042	1,226	1,996	1,301	6,505	9,406
Other African countries							4	12	16	4	27	25
U.S.A.	500	5,261	26,286	45,824	63,621	209,557	442,929	763,743	898,011	996,596	1,353,214	1,713,655
Canada .. .		250	350	795	913	316	166	332	1,522	1,447	3,581	8,483
Mexico .. .						3,634	157,069	115,515	39,530	40,241	44,086	48,547
Trinidad .. .						143	2,083	4,387	9,419	11,671	20,219	21,093
Venezuela .. .							457	19,687	136,669	148,254	185,570	323,156
Colombia .. .								1,007	20,346	17,598	25,593	22,449
Ecuador .. .							60	160	1,553	1,782	2,349	2,664
Peru .. .												
Argentina .. .					274	1,258	2,817	9,232	12,449	17,067	12,126	13,744
Other South American countries						20	1,651	6,336	9,002	14,297	20,609	22,881
Australia and New Zealand .. .									56	164	290	461
										5	8	8

*The Pechelbronn field in Alsace passed from Germany to France in 1918.

of products, gasoline, naphthas and white spirits, kerosine, gas oil, lubricants, diesel oils and fuel oils, transformer and switch oils, waxes and petroleum jelly, road oils and asphalts, to name the most important. The basic processes are fractionation and cracking. Some crude oils yield a full series of fractions from gasoline to heavy residual oils; others give little or no gasoline and kerosine, and yield only heavy oils. Some are waxy, whereas others are asphaltic. The products obtained in the refinery from any particular crude oil depend on (1) the composition of the oil, (2) market requirements, for it is possible, by modifying refinery technique, to vary the yields of different products from the same crude oil. Purification of the fractions for the market is generally effected by selective solvents (solvent refining) which remove deleterious compounds. Adsorptive substances, such as specially prepared fullers' earths, are also used.

A development greatly accelerated during and after the Second Great War is the synthesis of organic compounds in the refinery or in an associated chemical works. This applies not only to the production of substances such as isooctane required for aero-engine fuels, but to a multitude of very different substances—alcohols, glycols, various plastics, synthetic rubbers, lacquers and varnishes,

detergents, explosives, solvents, etc. The raw materials for these products are the gases from the cracking plant.

To produce branded products, fractions from various crudes are sometimes blended at the refinery or by firms which specialise in such work. A company which develops its own oilfields, transports, refines, blends, and distributes its own branded products to the retailer is said to be fully integrated.

WORLD PRODUCTION OF CRUDE OIL. The sources and amounts of the world's oil supply are shown in the table. For many years the U.S.A. produced and consumed 60 p.c. of the world's production, but after the Second Great War there [were signs of a change. Increasing consumption and concern for reserves brought that country into the ranks of the importers. At the same time production from the Middle East, which had proven reserves comparable with those of the U.S.A., began to expand and seemed likely to play a dominant part in world oil.

Prospecting, oilfield development, transport, and refining are all activities involving large expenditures, and there is thus a strong tendency to concentrate the control of the industry in large units. The major companies in the international field are: Standard Oil co. of New Jersey, Socony-

Vacuum Oil co., Standard Oil co. of California, The Texas corporation, Gulf Oil corporation, and Consolidated (Sinclair) Oil corporation, all of which are American; Royal Dutch-Shell group, Dutch and British; Anglo-Iranian Oil co., British. These companies operate by themselves and through numerous subsidiaries; they are fully integrated. Smaller British operating companies which are fully integrated are the Burmah Oil co. and Trinidad Leaseholds, Ltd.

No figure is available for the total capital invested in the world petroleum industry. It is probable that for the U.S.A. alone it exceeds £4,000 million. It is likewise impossible to give an average figure for net profits. The gross profits may appear large, but losses are great, and frequently capital, sometimes many millions of pounds, is invested for 10 to 20 years before oil begins to flow.

Oil in bulk is measured by volume and for crude oil the commonly accepted unit is the barrel, equivalent to 42 U.S. gallons (approx. 50 British gallons). This is often converted to tons (long, short, or metric), but if the results are to be accurate specific gravity must be taken into account. For rough estimates it is often assumed that 7 barrels of oil weigh one ton. If the oil is relatively light, sp. gr. 0.8, it will be a short ton; if the sp. gr. is 0.9 it

will be a long ton. Volume measurements are made at, or are corrected to, a temp. of 60° F. Tables are published to facilitate weight-volume conversions.

Bibliography. Petroleum Refinery Engineering, W. L. Nelson, 1936; The Science of Petroleum, ed. A. E. Dunstan, A. W. Nash, etc., 4 vols., 1938; Petroleum Production Engineering, 3 vols., L. C. Uren, 1924-1946; Modern Petroleum Technology, Institute of Petroleum, London, 1947.

Petrolia. Town of Ontario, Canada. It is 50 m. W. of London, having a station on the C.N.R. and Michigan Central rly., and obtained its name from oilfields in the vicinity. Industries include the making of butter, bricks, etc., and those connected with obtaining and refining oil. Pop. 2,684.

Petrology (Gr. *petra*, rock; *logos*, science). Science of rocks. One of the divisions of geology, it overlaps the kindred science of mineralogy, and is concerned with the composition, chemical and mineralogical, the structure, and the evolution or formation of rocks. It involves a knowledge of chemistry and of branches of physics, and the use of the petrological microscope. It differs from petrography, which is mainly the description of rocks.

Petrological study of a group of rocks, or of an area, begins on the ground, where the relationships of various rocks can be observed, and individual types are carefully plotted on maps. By noting the order of bedded rocks, and the intrusive relationships of igneous rocks, a time succession of events can be constructed, and the rocks identified by eye. Specimens of the various types encountered are also collected for detailed examination in the laboratory.

This examination varies with the character of the rocks. Sedimentary rocks, such as shales, sandstones, grits, and limestones, are studied with a view to deciding the conditions under which they were deposited, the source of the detritus from which they were formed, and the climatic or other conditions prevailing at the time. The study of igneous rocks, such as lavas or plutonic masses, is largely concerned with the causes and nature of chemical and physical variation between different rock-types, and the influence of the original country rock on the character of the intruding rock. The effect of hot solutions of steam or water carrying various reagents on the rocks shortly after

they have been consolidated, and the alterations involved, are also petrological problems which lead to the study of ore deposition. By observing the behaviour of artificial melts and the application of physico-chemical principles to the problems of lava consolidation, much has been learned about the way these rocks have been formed.

Investigation of metamorphic rocks involves not only the determination of what the original rock was before it was altered, but also the way in which the changes were brought about. Alteration by heat, pressure, or movement, and introduction of material from outside sources, are all recognized; but the part played by each factor is difficult to estimate. A fundamental problem in petrology is that of granitisation, i.e. the change of pre-existing rocks such as schists or slates into granite without their passing through a liquid stage. *See* Rocks. *Consult* Principles of Petrology, G. W. Tyrrell, 1926; Petrology of the Igneous Rocks, F. H. Hatch and A. K. Wells, 1937; Petrology of the Sedimentary Rocks, F. H. Hatch and R. H. Rastall, 1938.

Petrol Rationing. Measure taken in a number of countries during and after the Second Great War. In the U.K. it came into force at midnight Sept. 22-23, 1939. Private cars got a basic ration for 200 m. a month; supplementary petrol in special circumstances. Allowances according to need were made for commercial vehicles, doctors' cars, etc. The private car ration, twice reduced, was abolished July 1, 1942, allowances being made only for real need. A ration, for 120 m. a month (later 150 m.), was granted June 1, 1945, withdrawn Oct. 1, 1947. A ration for 90 m. a month, with seasonal increases, was granted June 1, 1948, until rationing of petrol ended at midnight May 26-27, 1950. Introduced to conserve supplies for the forces, it was maintained to keep down dollar expenditure.

Petronius (d. A.D. 65). Roman writer, whose full name was Gaius Petronius Arbiter. According to Tacitus he received his last name through being regarded as the supreme judge or arbiter of elegance in the vicious society in which he lived. Although he passed his days in sleep and his nights in business or pleasure, as governor of Bithynia he was a capable administrator. Apparently he aroused the jealousy of Tigellinus, and anticipated his fate by opening his veins in a warm bath.

Petronius wrote a remarkable work of fiction called *Satyricon*, of which fragments have been preserved. It describes the adventures of a Greek freedman in various parts of Italy, and shows a keen sense of humour and an exceedingly shrewd knowledge of human nature; it is valuable, moreover, as throwing light on the social life of the period. Many characters are made to talk in the *plebeius sermo*, or language of the common people, and the difference between this and literary Latin affords important material for the philologist. The best known section of the book is the *Cena Trimalchionis* (Supper of Trimalchio), which describes an entertainment at the house of a parvenu. *Consult* Petronius, Text and Trans., M. Heseltine, 1913.

Petropavlovsk. A town of Kazakh S.S.R. In the N. of the republic, it is on the Ishim and the Siberian rly., about 160 m. W. of Omsk. There are soap works and tanneries and a trade in grain, wool, and cloth. Formerly on a caravan route, the town has an Asiatic aspect. Pop. 91,678. Another Petropavlovsk is a seaport on Avacha Bay on the E. coast of Kamchatka, Far Eastern region of R.S.F.S.R.

Petropolis. Town and summer capital of Brazil, in the state of Rio de Janeiro. Finely placed 2,800 ft. above sea level, on the Serra da Estrella, 34 m. by rly. N. of Rio de Janeiro, in a healthy climate, it manufactures cotton and silken goods, cigars, cheese, and beer. It was colonised by Germans in 1845, and was capital of the state, 1893-1903. It was the scene of an inter-American defence conference convened by the Pan-American Union (*q.v.*), Aug. 15-Sept. 2, 1947, at which a treaty of mutual defence in pursuance of the act of Chapultepec (*q.v.*) was adopted by all the participating countries, except Ecuador (where a revolution broke out Aug. 23). The U.S.A. ratified the treaty Dec. 8. Pop. 45,000.

Petrozavodsk. Capital of the Karelo-Finnish S.S.R. It is built on the W. shore of Lake Onega, 185 m. N.E. of Leningrad, and connected by rly. with that city and Murmansk. There is regular air transport to Leningrad and Viborg (Viipuri). There are several educational institutions and research institutes. Formerly the capital of the government of Olo-nets, Petrozavodsk increased in importance with the creation of the Karelo-Finnish S.S.R., 1940.

Petruchio. Character in Shakespeare's comedy *The Taming of the Shrew*. He weds the notorious scold, Katharina, and by boisterous displays of violence succeeds in reducing her to docility.

Petsamo. Ice-free Arctic port in Murmansk region, R.S.F.S.R. Ceded by Russia to Finland in 1920 (whereby Russia's contact with Norway was cut off), Petsamo, after changing hands several times during the Russo-Finnish war, came firmly into Russian possession on Dec. 14, 1939. By the terms of the 1940 peace treaty, Soviet citizens were permitted to pass freely through the Petsamo area. Finland later joined Germany in the Second Great War, and, under the terms of the Russo-Finnish armistice, signed Sept. 19, 1944, Petsamo was again ceded to Russia, though German troops continued to fight in the area until Oct. 15.

Pett, PHINEAS (1570-1647). English shipbuilder. Son of a shipwright, he was born at Deptford, Nov. 1, 1570. He held various posts under Lord Admiral Howard, and in 1601 became assistant shipwright at Chatham. In 1605 he was appointed master shipwright at Deptford, and in 1607 at Woolwich. In 1630 he became a commissioner of the navy. The Prince Royal, 1610, and the *Soverayne of the Seas*, 1637, were his masterpieces. *Consult* Autobiography, ed. W. G. Perrin, 1918.

Petticoat Lane. Name until about 1830 of Middlesex Street, London, E. Running N. from High Street, Whitechapel, to Widegate Street, Bishopsgate, and extended and partly rebuilt since the latter part of the 19th century, it was known in Stow's time as Hog Lane, being then lined with elms. The French ambassador, Gondomar, is said to have lived in the adjacent Gravel Lane, in which the antiquary Strype was born. In the 17th century Petticoat Lane was the centre of a colony of French



Petticoat Lane, London. A busy scene in this noted Sunday market

refugee weavers, but it has for many years been a Jewish quarter, with clothing shops, and notable for its Sunday morning open-air market. *See* Houndsditch.

Petty, SIR WILLIAM (1623-87). English economist. Born at Romsey, Hants, May 26, 1623, he studied at Leyden and Paris, taught chemistry and anatomy at Oxford, and became professor of anatomy there, 1651. He was also professor of music at Gresham College, London. Employed in distributing forfeited lands in Ireland, he was made surveyor-general there after the Restoration. An M.P., an original F.R.S., and an inventor, he was a pioneer in economics, as shown by *A Treatise of Taxes and Contributions*, 1662, and many other works. He was knighted Dec. 16, 1687. His two sons were earls of Shelburne, and through his daughter, who married the earl of Kerry, his Irish estates descended to the marquess of Lansdowne. *Consult* *Economic Writings of Sir W. Petty*, ed. C. H. Hull, 1899; *Correspondence*, ed. Marquess of Lansdowne, 1928

Petty Officer. In the British navy, rank below and next to warrant officer, corresponding to that of non-commissioned officer in the army. Petty officers are selected from leading seamen of very good character with at least one year's sea-going service. Candidates are examined in general education, seamanship, elementary signals, semaphore, the rule of the road at sea, management of boats under steam, use of compass and lead, anchor work, rigging sheers and derricks, the water-tight fittings, pumps, and constructive details of the ship in which they are serving, and writing up the log book. The candidate must also have a gunnery or torpedo qualification.

In the military branch the petty officers include yeomen of signals, P.O. telegraphists, and sailmakers; in the engineering branch, stoker petty officers, mechanics, and engine-room artificers, the two last being chief petty officers; in the artisan branch, joiners, shipwrights, blacksmiths, plumbers, painters, coopers, armourers, and electrical artificers (the last being chiefs); in the medical branch, sick berth stewards; in the accountant branch, writers, ship's stewards, and cooks; also ship's corporals and masters-at-arms.

Petty Sessions. In English law, sittings of justices of the peace or of a stipendiary magistrate under certain statutes. The courts of petty session are those which try in a summary way, without a jury, certain

minor offences, and the amount of punishment which may be inflicted is strictly limited. *See* Magistrate; Metropolitan Police Court; Police Court.

Petunia. Perennial ornamental herb of the family Solanaceae. A native of S. America, it was introduced into U.K. early in the 19th century. The plants are from 6 ins. to 2 ft. high, and the funnel or salver shaped flowers are chiefly red, violet, blue, and white in various shades. They need ordinary greenhouse culture in spring, and may be planted out in the open garden in May or June. Propagation is by cuttings of old plants, or seeds sown in spring.

Petworth. Market town of Sussex, England. It is near the W. Rother river, 14 m. N.E. of Chichester and 55 m. by rly. S.W. of



Phineas Pett, English shipbuilder After W. Dobson



Petunia. Flower of this ornamental perennial



Sir William Petty, English economist



Petworth, Sussex. East Street and the parish church of S. Mary

London. S. Mary's church, an old building restored, has memorials of the Percy and Wyndham families. Stone quarries are in the neighbourhood, and cattle fairs are held in the town. On Sept. 29, 1942, a German aeroplane dropped a bomb on the school at Petworth, killing the headmaster, a woman teacher, and 30 children. The victims were buried in a common grave. Pop. 2,362.

Petworth House is the seat of Lord Leonfield. It occupies the site of a castle of the Percy family around which the town grew. From the Percys it passed to the duke of Somerset, then to the earl of Egremont. The 3rd earl of Egremont built the present house, about 1800, and in his time it was famous for its hospitality. It contains some fine carvings by Grinling Gibbons, and stands in a park 12 m. in circumference.

Peutinger Table. Only extant pictorial itinerary of the ancient Roman empire. Conrad Celtes, who discovered it at Ratisbon, 1507, bequeathed it for publication to Conrad Peutinger of Augsburg. It is a 13th century copy from a somewhat earlier version of a lost original, compiled probably in the 3rd century from older materials collected by Agrippa (d. 12 B.C.). Upon a strip 24½ ft. by 13½ ins. are 12 panoramic segments depicting—with distances—the military roads and trade-routes from S.E. Britain to the Ganges mouth.

Pevensey. Village of Sussex, England. It stands on Pevensey Bay, 6 m. N.E. of Eastbourne, and 12 m. W. of Hastings, with which it has rly. connexion. It occupies the site of the Roman station of Anderida, and was the landing place of William the Conqueror. A castle, of which picturesque

ruins remain, was built here by the Normans, who erected it within Roman walls that still stand. This is now the property of the nation, to which it was given by the duke of Devonshire. There is an old church, S. Nicolas, and the Mint House is said to be 600 years old. Pevensey, one of the Cinque Ports, was a corporate town from about 1066 until 1883. As the sea receded, the harbour filled with shingle, and the port decayed. Pop. 793.

Peveril of the Peak. Sixteenth of the Waverley novels, published 1823. Its period is 1658–78, and the scene shifts between Derbyshire, the Isle of Man, and London. It introduces the Popish Plot, and deals with the estrangement between the Cavalier Peverils and the Puritan Bridgenorths. The fanatic, Edward Christian, ready to sacrifice his niece Alice Bridgenorth to his revenge against the countess of Derby; Major Bridgenorth; whose enmity against the countess destroys his friendship with the Peverils; Buckingham, the king's favourite; the intriguer Chaffinch and his mistress; and the mercurial earl of Derby are the chief characters. The love interest centres on Julian Peveril and Alice Bridgenorth.

Pew (probably O. Fr. *puye*, a balcony). Name for an enclosed seat in a church; originally any enclosure fitted with writing desk, etc., where a public official could transact his business. Church pews, often elaborately carved, were used in the Middle Ages, but the large, plain, and high-backed box pew came in after the Reformation. The appropriated family pew disappeared shortly after the middle of the 19th century. The partitions between box pews were 4–5 ft. high; and access was through a small door. A few of these survive in English and Scottish churches, but the modern pew is merely a bench with a back. The custom of renting pews has become less general in English parishes.

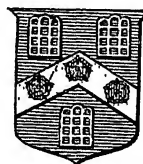
Pewsey. Town of Wiltshire, England, on the Avon, 11 m. S. of

Marlborough, with which it has rly. connexion. The old church of S. John the Baptist has been restored. The town is an agricultural centre. The valley in which it lies is called the vale of Pewsey. Pop. 1,574.

Pewter. Alloy at one time very largely used for the manufacture of drinking vessels, flagons, salt cellars, trays and plates, inkpots, etc. Its preparation in Great Britain was more or less regulated for many generations by the Pewterers' Company of London. While the composition of pewter has varied much, the commonest variety consists of about 80 p.c. tin and 20 p.c. lead; a class known as "trifle" pewter has tin 79 parts, antimony 15, and lead 6; while a "plate" pewter is made without lead at all, and consists of tin 90 parts, antimony 7, bismuth 2, and copper 1 part. As a metal pewter is soft, somewhat resembling tin in colour, but duller and darker. Owing to the risk of poisoning by lead through the constant use of pewter, its use has been restricted. Old pewter is a favourite of collectors of rare objects. See Alloy; Britannia Metal.

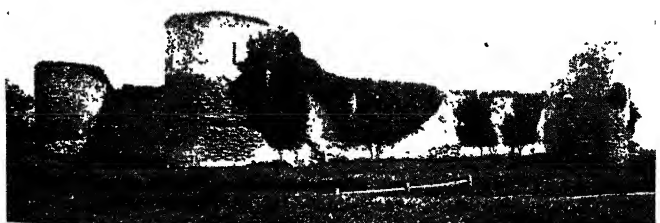
Bibliography. Old Pewter, M. Bell, 1906; Pewter Marks and Old Pewter Ware, C. A. Markham, 1909; Pewter Plate, H. J. L. Masse, 2nd ed. 1910; The Pewter Collector. H. Jenkins, 1921.

Pewterers' Company, THE. London city livery company. With a history going back to the middle



Pewterers' Company arms

of the 14th century, its first charter was granted in 1474, arms being allowed in 1479. It formerly had rights of search and assay. The first hall, in Lime Street, E.C., was built in 1497, and destroyed in the fire of 1666, was rebuilt 1678, again burnt in 1840, and then rebuilt a second time. The address is now 62, New Broad Street, E.C.2.



Pevensey, Sussex. The walls of the ruined Norman castle, from the north-west

Peyotl. Species of spineless cactus (*Lophophora williamsii*), with a large, parsnip-like root. Aztecs cut this root into transverse slices, to be powdered, and ate it, or took it in drink, with religious ceremony, under the name of *teonanacatl*, or "flesh of God." Under its influence the consumer saw visions, and was said to have the power of prophecy. Similar ceremonial use of the plant is made in the present day by various Indian tribes in Oklahoma.

Peyrouton, MARCEL (b. 1888). French govt. official. A colonial civil servant, he held posts in Algeria, Tunisia, and Morocco 1930-36, when he was sent as ambassador to Argentina. After the defeat of France in 1940 he joined the Vichy govt. in July as secretary-gen. for home affairs (minister of the interior), and was responsible for Laval's arrest in Dec. In Feb., 1941, he returned to Argentina as ambassador, resigning next year. Appointed gov.-gen. of Algeria by Gen. Giraud in Jan., 1943, he resigned at the end of May. In Dec. he was arrested, and in 1944 flown to France and interned in Fresnes prison near Paris. Still under arrest, he gave evidence at Pétain's trial in 1945. Brought to trial in Paris, Dec., 1948, on charges of collaboration with the Germans, Peyrouton was acquitted on all counts.

Pézenas. Town of France. In the dept. of Hérault, it stands on the Peyne, near the mouth of the Hérault, about 25 m. S.W. of Montpellier. There is a trade in wines and spirits, and there are iron foundries, oil and brandy refineries, and tanneries. Molière wrote his *Précieuses Ridicules* here. Pézenas is the *Gallio Piscenae*. *Pron.* Paiznah.

Pezinek. Town of Czecho-Slovakia. Formerly it belonged to Hungary, when it was known as Bazin. It is built on the S. edge of the Little Carpathians, 12 m. by rly. N. of Bratislava, and contains mineral springs and baths.

Peziza. Genus of fungi of the family Discomycetes. They are fleshy, brittle fungi, cup-shaped or saucer-shaped, having their spore-producing cells immersed in the flesh of the disk, the exterior scurfy or warty, and often some tint of brown or a brilliant orange. A common form, *P. vesiculosa*, is found on manure heaps and rich cultivated ground.

Pfäfers OR BAD PFÄFERS. Swiss bathing establishment. It is 2½ m. by road S. of Ragatz (*q.v.*) in the

canton of St. Gall. Pop. 1,900. Alt. 2,710 ft. In the romantic gorge of the Tamina, alt. 2,235 ft., it has a saline spring, efficacious in nervous, rheumatic, and scrofulous disorders. The spring (temp. 100° F.) was discovered in 1038, and the first bathhouse was built in 1242. The Benedictine abbey of Pfäfers, founded about 724, was rebuilt in the 17th century; it was converted into a mental hospital in 1847.

Pfennig. Coin of the German currency. Since 1871 it has represented the one-hundredth part of a mark (*q.v.*). It was originally, like the penny, a silver coin 240 of which, according to Charlemagne's regulations, were to weigh a pound. During periods of war and monetary inflation, 1, 5, 10, and 50 pfennig pieces have been made of iron, aluminium, zinc, and various alloys. Normally copper coins of 1 and 2 pfennigs have been issued, and silver coins of 50 pfennigs.

Pfäffer, EDUARD FRIEDRICH WILHELM (1829-1910). German physiologist. Born at Hanau, June 7, 1829, he studied medicine at Bonn, where in 1878 he established an institute of physiology. Researches in metabolism and respiration led him to the discovery about 1859 that the seat of respiration is not in the blood or lungs but in the tissue. Conducting embryological experiments, he succeeded in the cross-fertilisation of the eggs of different species of frogs. He died March 16, 1910.

Pforzheim. Town of Württemberg-Baden, W. Germany. At the union of the Nagold and the Enz, 16 m. S.E. of Karlsruhe, it is a rly. junction. The chief buildings are the town hall, the church, in which are the tombs of some of the margraves of Baden, and the palace in which those rulers lived. The chief industry is making jewelry and gold and silver ornaments; others are the manufacture of machinery, chemicals, paper, and beer. A Roman settlement,

Pforzheim became part of Baden, and from 1300 to 1565 was the residence of the margraves. Reuchlin was born here. Much erudition has been bestowed upon a story that in 1622, after the battle of Wimpfen, 400 citizens gave up their lives for their ruler, but it is now believed to be fiction. The town stands on the N. edge of the Black Forest. Pforzheim was captured from the Germans by units of the French 1st army on April 8, 1945, and came within the French zone of occupation. Pop. (1950) 47,500.

Phaeacians. People represented in the *Odyssey* as inhabiting the island of Scheria in the farthest W. Their king Alcinous (*q.v.*) hospitably entertained Odysseus. The Phaeacians lived in much luxury, and were famed for their dancing: their name became proverbial for persons of self-indulgent disposition.

Phaedo. Greek philosopher. A native of Elis, where he was born towards the end of the 5th century B.C., he made the acquaintance of Socrates at Athens. After the death of the latter, he returned to his native place and set up a Socratic school. He is chiefly remembered in connexion with Plato's dialogue on the immortality of the soul, which bears his name.

Phaedra. In Greek mythology, daughter of Minos, king of Crete, and wife of Theseus, king of Athens. She took her own life because the passion she had conceived for her stepson, Hippolytus, was not returned by him. See Hippolytus.

Phaedrus. Latin fabulist. A Macedonian slave freed by the emperor Augustus, he published a collection of about 100 fables and occasional pieces. The fables, partly imitated from Aesop (*q.v.*), have had wide use as a schoolbook, and served in part as a model for La Fontaine.

Phaestus. Ancient city of Crete. It is 25 m. S.W. of Candia, on a ridge commanding the rich plain of the Messara, and was occupied from Neolithic to Venetian times. Ruins of a great palace, second only to Knossos (*q.v.*), were excavated from 1900 onwards. Beneath the palace, built about 1800 B.C., are the remains of an earlier one. Two miles away, at Hagia Triada on the same ridge, is a small palace of about 1600 B.C., where rich finds were made of inscribed tablets, frescoes, seals, and steatite vases, with realistic reliefs of a harvest procession, games, etc. See Crete.



Peziza badius, the brown species

Phaestus Disk. Clay tablet, now in the Candia Museum, Crete. Discovered in a subterranean palace chamber at Phaestus in 1908, it is attributed to the latest Middle Minoan period. Nearly 7 ins. in diameter, it bears on both sides in spiral lines 241 pictorial characters printed from 45 stamps. The pictures include a mastless galley and seamen with close-fitting caps of northern origin. The script is non-Egyptian and mostly non-Minoan; Evans suggested that it might be a religious chant. See Alphabet; Clay Tablets.

Phaethon (Gr., shining). In Greek mythology, the son of Helios, the sun-god. Attempting once to drive his father's chariot across the skies, he proved too weak to control the spirited horses, with the result that he came so near to earth that a portion of it was burned, the parched condition of the Sahara being attributed to this mishap. Thereupon Zeus killed the presumptuous youth with a thunderbolt, and he fell into the river Eridanus.



Phaeton. Four-wheeled, two-horse mail phaeton

Phaeton. High, four-wheeled open carriage, for one or two horses. Invented in the second half of the 18th century, and named after Phaethon, it was long fashionable, until largely superseded by the landau and victoria.

Phagocytes (Gr. *phagein*, to eat; *kytos*, a vessel). Name given to one type of the white corpuscles of the blood (*q.v.*). The destruction of micro-organisms by the phagocytes is known as phagocytosis.

Phagocytosis. Term for ingestion of foreign particles, *e.g.* bacteria, injured or surplus tissue, by certain white blood cells and by some other cells of the body such as the Kupffer cells of the liver.

Phalangeridae (Gr. *phalanges*, bones of the fingers or toes). Family of small marsupials of arboreal habit, found only in

Australasia, where they are falsely called opossums. Phalangers are distinguished by the curious construction of the hind feet. The first toe has no nail, and can be opposed to the others like a thumb, while the second and third toes are enclosed in a common skin; the foot being much like that of some of the kangaroos. All phalangers have thick, woolly coats, and with the exception of one species have long tails, often more or less prehensile. They move about the trees by night and feed mainly on fruit and leaves; but some species are practically omnivorous. The koala (*q.v.*) belongs to this family, though it has little outward resemblance; and among phalangers we find the only marsupial that has the power of gliding flight. See Flying Phalanger.

Phalanx (Gr.). Tactical formation of infantry introduced by Philip of Macedon and perfected by Alexander the Great. Macedonian spearmen, with very long spears, were arranged many ranks deep, so that many spears projected beyond the first line. With this formation an irresistible charge was made. Alexander's great victories over the Persians at Issus, 333 B.C., and Arbela, 331, were largely due to the phalanx. At the beginning of the 2nd century B.C. the Romans came into conflict with the Macedonians, and a loose formation composed of soldiers armed with short swords, was pitted against the hitherto invincible phalanx. The Romans checkmated the phalanx by giving it no opportunity to charge, luring it on to broken ground, and breaking it up with missiles. The efficacy of these tactics was proved by the signal victories of the Romans at Cynoscephalae, 197 B.C., and Pydna, 168. After Pydna the phalanx was not heard of again.

Phalaris (d. c. 554 B.C.). Tyrant of Agrigentum, in Sicily. Notorious for his cruelty, he is said to have roasted his victims in a brazen bull, invented by Perillus of Athens, who is alleged to have suffered death in it himself. Phalaris held power for about 16 years, at the end of which he was overthrown

and is reported to have been roasted in his own brazen bull. The Letters attributed to him were proved by Bentley (*q.v.*) to have been forged.

Phalarope (Gr. *phalaris*, coot; *pous*, foot). Small, migratory shore bird related to the snipe. Two species occur in Great Britain, the red-necked phalarope (*Phalaropus lobatus*) and the grey phalarope (*P. fulicarius*). The former has plumage of grey and white, with a chestnut neck, and breeds in the Hebrides and Shetlands, nesting on the ground among the heather. The grey variety is an irregular winter migrant to the S. coasts of England.

Phalerum. Former port of Athens, now a seaside resort. It stands on a bay about 3 m. from the town. Up to the time of the Persian wars it was the chief port. *Pro. Fa-leerum.* See Athens.

Phallism OR PHALLIC RITES (Gr. *phallos*, the virile member). Usages and rites concerned with the reproductive forces of nature, as symbolised by the organs of sex. Phallic worship, in the sense of veneration of the symbols or of the deities and powers symbolised, is rarely found. But phallism as a form of ritual magic, widespread in antiquity, still pervades surviving primitive cultures throughout the world.

In the magico-religious phase of man's emotional life the belief that the fertility of crops and herds could be assured by means of sympathetic magic induced practices, generally at seasonal festivals, which are usually called phallism. They apparently arose among settled Neolithic peoples, especially in the regions which gave birth to the Hamatic and Semitic stocks. They survived in dynastic Egypt in connexion with the cult of Min and Osiris, and in W. Asia in connexion with that of Cybele, Atargatis, and Baal. The Greek cult of Dionysus and the ithyphallic (Gr. *ithys*, straight) statues of Hermes at Athens were aboriginal and non-Hellenic. Similarly, Indian phallism is Dravidian rather than Aryan. See Lingayat.

Phaltan. State and town of India, forming, since 1947, part of the United Deccan state. The state is bounded on the N. by the Nira river, and lies E. of the rly. from Poona to Belgaum. Timber and native food grains are the chief products; coarse textiles are manufactured. Its area is 397 sq. m. Pop. 71,473. The town is in the middle of the state, 52 m. S.E. of Poona.

Phantom. Code name of the British G.H.Q. liaison regiment formed in 1940. Its function was to keep army, army group, and base h.q. informed of changes in the battle-front situation, and patrols served in France in 1940, and in Greece, N. Africa, Italy, and throughout the campaigns following the invasion of Normandy. The regiment had a wartime strength of 1,350 officers and men, with its h.q. in huts in St. James's Park, London. The regimental flash was a white P on black. See General Headquarters.

Pharaoh. Kingly title in ancient Egypt. The English spelling is derived from the grecised and hebraised forms of the Egyptian Per-'o, great house. In the pyramid age this term denoted the royal estates, and during the Middle Kingdom tended to be used symbolically. With the new empire it became a personal title, and in Shishak's time accompanied the personal name. The O.T. references to later monarchs, Pharaoh-Necho and Pharaoh-Hophra, were therefore strictly accordant with contemporary usage. Thereafter Pharaoh came to denote colloquially whoever was the reigning king.

The identification of the Pharaohs of the O.T. earlier than Shishak—the first mentioned by name—is uncertain. The Pharaoh to whom Joseph was vizier was apparently a Hyksos king, regarded by late classical tradition as one of the Apepis. The Pharaohs of the Hebrew oppression and exodus from Egypt have long been identified with Rameses II and Merenptah, but the evidence of the Amarna tablets and the Israel stela inclines many scholars to displace these identifications in favour of Thothmes III and Amenhotep II. The daughter of Pharaoh whom Solomon wedded was apparently a daughter of Pasebkhanut II, last of the XXIIst dynasty. See Aaron; Egypt.

Pharaoh's Serpent. Chemical toy. It consists of mercury thiocyanate (sulphocyanide) made into small cones or pills by means of mucilage of tragacanth. When lighted, it forms a long, bulky mass, resembling a serpent. This is due to the decomposition of the mercury sulphocyanide by the heat into mercury vapour and a substance known as mellone. The vapour given off is poisonous.

Pharisees (Heb. *parush*, separated). Religious party among the Jews. They sprang from the Chasidim (*q.v.*), during the Maccabean

wars, and were originally the patriots of the nation, who insisted on the permanent separateness of the Jews from the Gentiles, and upon the eternal and unchanging authority of the law of Moses. Often called Chaberim (scholars), they were collectors of the teachings and traditions of the Rabbis, in contrast with the Sadducees, who maintained that the individual conscience is superior to the teaching of anyone, and that the simple letter of the law is all that is needed for the guidance of the individual. In the time of Christ, as the champions of Jewish nationalism they were politically opposed to the Sadducees and Herodians; but all were agreed in their opposition to the teaching of Christ. The Pharisees became rigid formalists. In the struggle of the Jews for national existence, the Zealots represented the militant section of the Pharisees. See Jews.

Pharmaceutical Society. British body established in 1841 for the purpose of advancing chemistry and pharmacy, promoting the education of those who practise the same, and protecting persons who carry on the business of chemists and druggists. A royal charter of incorporation was granted in 1843. Under the Pharmacy Acts the society conducts examinations in pharmaceutical chemistry, pharmaceutics, and pharmacognosy, qualifying persons for registration as pharmaceutical chemists, or chemists and druggists; and institutes proceedings against persons who contravene the Pharmacy Acts. It publishes the *Pharmaceutical Journal*. The offices are at 17, Bloomsbury Square, London, W.C.1.

Pharmacopoeia (Gr. *pharmakon*, a drug; *poiein*, to make). Authoritative treatise on the preparation, constitution, and dosage of drugs and medicines. The British Pharmacopoeia is issued by the General Medical Council. An international pharmacopoeia was compiled by the World Health Organisation in 1950.

Pharmacy. Greek word meaning originally the use of drugs. It appears to have been at first practised by priests, this being the custom in Egypt and among the Jews, and later in Europe it was largely in the hands of monks. For long a great deal of superstition was mingled with the art. In the 17th century the word began to be used for the compounding of medicines, and the work of the chemist (*q.v.*) became distinct from that of the medical man. An Act of Parlia-

ment protecting the title of pharmaceutical chemist was passed in 1852, and in 1868 another Act required all future chemists and druggists to pass examinations and to be registered. See Dispensing.

Pharmacy and Medicines Act. British Act of Parliament passed in 1941 which amended the Pharmacy and Poisons Act 1933 as regards the sale of poisons. It further prohibited advertisements referring to any article in terms likely to lead to its use to procure abortion or for treating Bright's disease, cataract, diabetes, epilepsy or fits, glaucoma, locomotor ataxy, paralysis, or tuberculosis. (Advertisements advocating the use of articles for treating cancer had already been forbidden in 1939.) The Act further made it compulsory to disclose on the article or on its label or container the composition of any substance sold and recommended as a medicine; and restricted the sale of medicines by persons who are medical practitioners, dentists, authorised sellers of poisons, or otherwise qualified. It also repealed the excise duty on patent medicines.

Pharos. Western extremity of the city of Alexandria. Formerly an island, it was joined to the city by a causeway which divided the harbour into two portions. Here stood the ancient Pharos, or lighthouse, accounted one of the seven wonders of the world, built under Ptolemy II, about 280 B.C., and reaching a height of about 500 ft. The site of the old lighthouse was later occupied by the picturesque Fort Kait Bey. See Lighthouse.

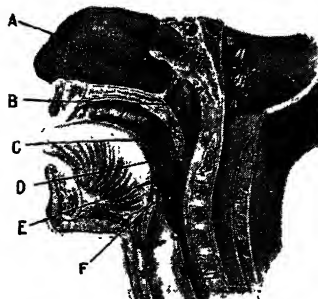
Pharsalus. Town of ancient Greece, in the dist. of Pharsalia, Thessaly. Situated near the river Enipeus, it was the scene of fighting during the war between Rome and Macedonia (197 B.C.).

The battle of Pharsalus was fought Aug. 9, 48 B.C., on the territory (Pharsalia) of the town of Pharsalus, between Caesar with 22,000 men, and Pompey with twice that number. It was the decisive battle of the civil war, Pompey's complete defeat making further organized resistance to Caesar impossible. See Lucan.

Pharynx (Gr., throat). Cavity extending from the base of the skull to the level of the cricoid cartilage of the throat, where it becomes continuous with the oesophagus or gullet. About 4½ ins. long, it lies behind the mouth and nose, and through it food passes from the mouth to the oesophagus, also air between mouth and nose and the larynx.

The Eustachian tubes (*q.v.*) open into the upper part of the pharynx, one on each side.

Inflammation of the pharynx is known as pharyngitis. Acute pharyngitis may be the simple sore



Pharynx. Section of throat showing position of the pharynx. A. Posterior edge of nasal septum. B. Orifice of Eustachian tube. C. Soft palate. D. Palatine tonsil. E. Pharyngo-palatine arch. F. Epiglottis

throat of a common cold, or may be due to more serious infection from scarlet fever, diphtheria, etc. Chronic pharyngitis or "clergyman's sore throat" is a condition met with in speakers, costermongers, and others; resulting from over-use or wrong production of the voice. It may be associated with excessive smoking and drinking. Treatment demands rest of the voice and abstinence from smoking and alcohol. Astringent or soothing sprays may be prescribed. Recurrent loss of voice indicates the presence of septic teeth or tonsils, and a physician should be consulted, lest more serious causes exist. See *Anatomy*; *Man*.

Phase. Electrical term, thus defined by the British Standards Association: in an operation which recurs periodically, the stage or state to which the operation has proceeded; the fraction of the whole time which has elapsed, measured from some fixed origin. The term is most often used in speaking of alternating or oscillating currents or voltages, the peri-

odic variations of which might be represented by the revolution of a radius round the centre of a circle, as shown at *A* in the accompanying drawing.* It is, however, more convenient to project this motion, as seen at *B*, in the form of a sine wave. Equal angular movements of the imaginary radius are then indicated by equal divisions of the horizontal straight line; and the phase at any instant is the angle swept out by the radius between its departure from zero and that instant.

At the end of each cycle, or period, the phase is regarded as having reached 360° and to be starting again at 0° , just as the hour hand of a clock starts again from zero after reaching 12. Electrically, then, it is usual to regard phase as a matter of angle. At *C* the voltage is leading by 90° on the current (or the current lagging by 90° on the voltage), since the voltage has reached 90° before the

current has started to rise. Voltage and current are in phase at *D* and 180° out of phase in the imaginary state of affairs depicted at *E*. Radio waves from the same source, reaching an aerial by paths of various lengths, may arrive in phase, 180° out of phase, or out of phase by any intermediate phase angle. Ordinary domestic A.C. is single-phase, each current cycle consisting of a single alternation. For commercial and other purposes 2-phase, 3-phase and poly-phase currents are used. Current of the 2-phase type consists of "interlaced" alternations 90° out of phase. In 3-phase current the angle between phases is established at 120° .

Phase (Gr. *phasis*, appearance). In astronomy, term used for the different luminous appearances of the moon and certain planets. Phases of the moon are caused as the moon travels in its orbit about the earth, thus altering the amount of illuminated surface which is seen.

The phases of the inferior or inner planets, Mercury and Venus, are similar to those of the moon, but take a complete Mercurial or Venusian year for their accomplishment. The crescent Venus or Mercury occurs as the planets come more and more in line between the earth and the sun. Thus when these planets are nearest the earth less of the surface becomes visible. The exterior planets can never show crescent phases, though Mars may appear gibbous. See *Moon*.

Pheasant. Family (*Phasianidae*) of game birds greatly esteemed for the table. The family includes over 50 genera, and comprises the partridges, quails, domestic poultry, guinea fowl, and peafowl. Typical pheasants, to which belongs the common pheasant of British woods, form the genus *Phasianus*, including over a dozen species. In a wild state the true pheasants range from S.E. Europe across

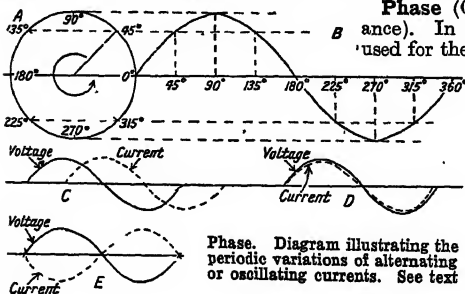


Pheasant. Cock of the common variety of this bird
W. S. Berridge, F.Z.S.

Central and S. Asia to Japan, and are usually found in wooded valleys. In structure they have much in common with the partridge, but have a long and wedge-shaped tail.

The common pheasant (*Phasianus colchicus*) is a native of Turkey, Greece, and Asia Minor, and is believed to have been introduced into Britain by the Romans. It has been freely interbred with other sub-species introduced later, notably the ring-necked pheasant (*P. c. torquatus*) from China and the green pheasant (*P. c. versicolor*) from Japan.

The pheasant feeds upon insects and snails, in addition to seeds, grain, and berries. It will flourish in coverts without attention if protected from foxes and poachers: it roosts in lower branches of trees. It is polygamous in habit. About a dozen eggs are laid by each hen in April, the nest being placed under a bush, among stubs in



Phase. Diagram illustrating the periodic variations of alternating or oscillating currents. See text

coppie, or in the heather. The hen sits well enough if undisturbed, but, to make sure, it is the practice of gamekeepers to collect the eggs and set them under domestic hens. The chicks are thus practically reared by hand, their food being regularly provided and no inducement given them to stray far from the place of their hatching.

It is now the practice to drive the birds towards the guns by means of beaters, rather than to walk them up over dogs. A few dogs may be usefully employed in picking up wounded birds, but dogs in a big day's pheasant shoot are now seldom in evidence. The birds should be driven away from home. Many varieties of sporting shots may be obtained in pheasant shooting, especially at high-flying birds. The pheasant-shooting season lasts from Oct. 1 to Feb. 1, inclusive. See *Argus Pheasant*; *Beak*; *Birds*, colour plate.

Pheasant's Eye OR **BRAD'S EYE** (*Adonis annua*). Annual herb of the family Ranunculaceae. A native of Europe (rare in the U.K.), W. Asia, and N. Africa. It has short, branching stems, with numerous much-divided leaves, the segments reduced to threads. The flowers are nearly globular. The sepals are like petals, but greenish, and the petals scarlet with a darker spot at the base, which constitutes the pupil of the eye indicated by the name. The name bird's eye is usually associated with the bird's-eye primrose (*Primula farinosa*), and pheasant's eye is also applied to the poet's narcissus. See *Narcissus*.

Pheidias (c. 490-432 B.C.). Sculptor of ancient Greece. Born at Athens, the son of Charmides, he studied in the school at Argos under Ageladas. On his return to Athens he was employed on the famous statue of Athena Parthenos, and, his great gifts being appreciated by Pericles, he became superintendent of all the artistic undertakings carried out during the latter's administration. Thus he is said to have directed the execution and decoration of the whole group of buildings on the Acropolis. Later he was accused of impiety for having sculptured his own likeness on the shield of Athena Parthenos, and of misappropriation of the treasure entrusted to him, and is said either to have died in prison or to have fled to Elis, where he executed the chryselephantine (*q.v.*) statue of Zeus for the Eleians.

Pheidon. King of Argos, who probably reigned during the 7th

or 8th century B.C. An energetic ruler, he enlarged the boundaries of Argos, reduced Corinth and Aegina to the position of vassals, and seems to have contemplated the subjection of the whole of Peloponnesus. He introduced a new standard of weights and measures, and had a mint at Aegina, where silver money, according to some ancient authorities, was first coined. He checked the encroachments of the Dorian oligarchs on the royal prerogatives. He is said to have been killed in battle at Corinth.

Phelps, SAMUEL (1804-78). British actor. He was born at Devonport, Feb. 13, 1804, and



Samuel Phelps,
British actor

made his first London appearance as Shylock at The Haymarket, Aug. 28, 1837. For five years he played with Macready at Covent Garden and Drury Lane. On May 27, 1844, he opened Sadler's Wells Theatre as Macbeth, and gave his last performance there, March 15, 1862, having produced 31 of Shakespeare's plays and made that theatre a power in the dramatic world. He died Nov. 6, 1878. *Consult* Life, W. M. Phelps and J. Forbes-Robertson, 1886.

Phenacetin OR **ACETOPHENETIDIN**. Colourless crystalline substance, a coal-tar derivative, first prepared in 1887. Sparingly soluble in water, odourless, and almost tasteless, it is frequently used to relieve the pain of headache, neuralgia, migraine, sciatica, and locomotor ataxia. Prolonged use may cause haemolysis of the red blood corpuscles.

Phenacite. In mineralogy, name given to beryllium orthosilicate. Colourless, yellow to pale red in colour, transparent to subtranslucent, the mineral is found in pegmatites, veins, and druses associated with granite, also in mica schist. It is cut and polished as a gem, the colourless varieties resembling diamonds when cut. The name of the mineral is derived from the Greek *phenax*, a deceiver, from the fact that the mineral is very similar to quartz in appearance and likely to be mistaken for it.

Phenazonum OR **ANTIPYRIN**. White crystalline powder introduced in 1884 for use as an antipyretic, later employed as an analgesic to relieve the pain of

headache, neuralgia, sciatica, etc. It is soluble in water, alcohol, and ether. The drug is liable to cause a skin rash.

Phenobarbitone. A drug of the barbiturate (*q.v.*) group.

Phenocryst. In petrology, a component crystal of a rock which is conspicuously larger than the average grain-size of the rock, and which, genetically, is considered to have crystallised from the rock-melt before the matrix in which it occurs. This texture is called porphyry, hence porphyry (*q.v.*).

Phenol. Alternative name for carboic acid (*q.v.*).

Phenolic Plastics. Group of synthetic materials. They are in the main based on the condensation of phenol and formaldehyde, first shown to be a commercial possibility by Baekeland in 1908. They are of the thermohardening type, and their development, in the years after the First Great War, laid the foundation of much later industrial change. In 1919 annual production was about 1,500,000 lb.; but by 1948 the monthly production in the U.S. was 29,455,000 lb.

Phenology. Term applied to the study of the time of occurrence of recurring natural phenomena, e.g. the flowering of plants, the leafing of trees, and the first and last appearances of birds and insects, as related to the weather.

Phenolphthalein. Crystalline substance obtained by heating phenol with phthalic anhydride and sulphuric acid, the product being afterwards purified. It is used under various names as an aperient. In chemical analysis phenolphthalein is employed as an indicator, because with alkalis a distinctive pink colour is obtained.

Phenomenalism. A theory which considers that only the phenomena directly presented to us, or the ideas that we derive from them, are real. In the one case it is realistic, in the other idealistic. There are no things-in-themselves, behind, and the cause of, the phenomena, which are really what they appear to us to be. See *Metaphysics*; *Sensationalism*.

Phenomenon (Gr. *phainomenon*, that which appears). Term in metaphysics, denoting that which appears to the senses, conditioned by space and time, as contrasted with that which is apprehended by the mind. It is not the real thing, but only the thing as it appears to us. The term is also applied to any remarkable person or thing, e.g. an infant phenomenon. In science,

the word is used to describe a natural process, e.g. the phenomenon of crystallisation.

Phenotype. Term used in biology, especially in genetics, to mean the type of organism as characterized by its external appearance in contrast to its capacity for transmitting characters to its progeny, i.e. its genotypic constitution. Thus, the tall pea plants which arise out of a cross between a pure breeding tall and a pure breeding dwarf pea plant are tall phenotypes because their observable character is tallness, but are heterozygous genotypes because they inherit genes for both characters and can transmit them severally to their offspring.

Pherecydes (c. 550 B.C.). Greek philosopher, sometimes included among the Seven Wise Men of Greece. He is reckoned the creator of Ionic prose. According to him, Zas (Zeus), Chronos (Time), and Chthoniē (Earth) had existed from the beginning, and the world was the result of the working of Zeus and Chronos upon earth. It consisted of five elements—ether, fire, air, water, and earth. He is said to have been the teacher of Pythagoras, and to have first enunciated the doctrines of metempsychosis and the immortality of the soul. *Prom. Ferrysi-deez.*

Phi Beta Kappa. Oldest college fraternity in the U.S.A. It originated as a secret social club and literary society, Dec. 5, 1776, at William and Mary College, Williamsburg, Virginia. Chapters were established at Yale in 1780, Harvard in 1781, and Dartmouth in 1787. It now includes nearly 100 additional chapters with a membership of about 28,000. Women were admitted in 1875. The



Phi Beta Kappa.
Badge of the
fraternity

society is controlled by a national council, and includes both past and present graduates in arts and science. The badge is in the form of a key inscribed on the obverse with the Greek letters Ph B K (representing *Philosophia Bion Kubernētēs*, Philosophy the guide of life), and a hand pointing to a group of stars; and on the reverse with the letters S.P. (*Societas Philosophiae*), the date Dec. 5, 1776, the names of its owner and his or her college, and the date of his or her graduation.

Phigalia. City of Arcadas, in ancient Greece, on the borders of Messenia. Frequently mentioned by ancient writers, it is chiefly noted for the famous temple of Apollo Epikourios, at Bassae, in its territory about six miles away. The remains of the temple, which was built by Ictinus, the designer of the Parthenon, and was considered the most beautiful temple in the Peloponnese, are in an excellent state of preservation. The frieze, representing combats of Greeks with Amazons and Centaurs, is now housed in the British Museum. Phigalia is the modern Pavlitzia.

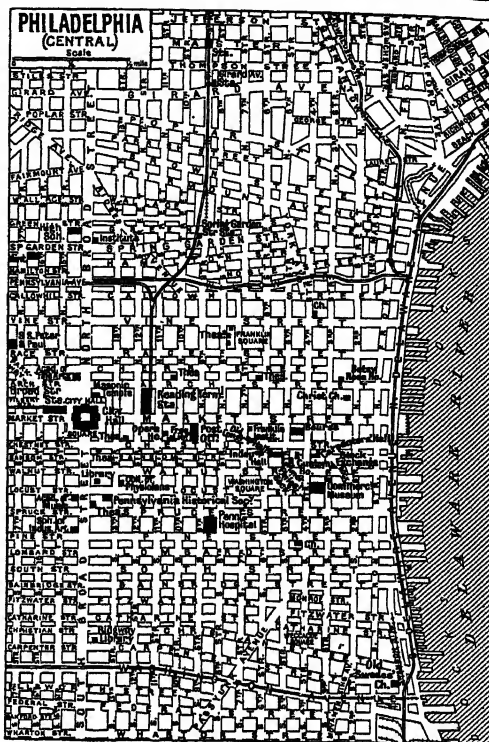
Philabeg OR FILLBEG. Kilt of

Scottish Highlanders. The word is derived from the Gaelic *feilidh*, kilt, *beag*, small, as distinguished from the old form which covered the whole body. See Highlands.

Philadelphia. Ancient city of Lydia, Asia Minor. Founded by Attalus Philadelphus, king of Pergamum about 140 B.C., it is now represented by the walled city of Alasehir at the N.E. base of Mt. Tmolus, 104 m. by rly. E. of Izmir. See Alasehir.

Philadelphia (Gr., brotherly love). City and port of U.S.A. It stands on the right bank of the Delaware river, 96 m. from its mouth, and 90 m. by rly. from New York. Built on an almost level plain, it covers nearly 130 sq. m., and is intersected by the Schuylkill river. Third U.S. city in number of its inhabitants, its 1940 pop. of 1,931,334 was somewhat under that of 1930.

Innumerable small homes are a characteristic of Philadelphia. Two and three storeyed houses of red brick, with white marble steps, run for miles along straight, tree-



Philadelphia. Plan of the centre part of the city showing railway communications

shaded streets. Broad Street bisects the city from N. to S., and where Market Street cuts it at right angles is the City Hall Square. The chief wholesale houses occupy Market Street, and just S. of it is Chestnut Street with the leading retail stores and the principal newspaper offices. Rittenhouse Square to the S.W. of the city hall was the 19th century aristocratic quarter; wealthy and conservative families have since lived along the main line of the Pennsylvania Railroad and are nationally known as the "main line" aristocracy. A commentator has noted that "the people who own the city have abandoned it," emphasising the fact that old Philadelphia fortunes are commonly derived from real estate.

The inadequate city revenue and consequent lack of street repairs have given central Philadelphia a somewhat frowsy appearance despite its fine 19th century buildings. Philadelphia's only water supply is the water, rendered harmless by chlorination, of the Delaware and Schuylkill rivers, into which thousands of gallons of raw sewage from the city and from factories upstream



Philadelphia
arms

pour daily. The port of Philadelphia has been described as the "largest and foulest fresh-water port in the world."

William Penn, in 1682, founded Philadelphia as a Quaker colony, absorbing a small Swedish settlement of 1632. The Quakers established a public grammar school as early as 1689. Penn's laws were in advance of his time and Quaker belief in modesty, diligence, and the innate goodness of man worked their way deep into the early community. Many leading Quakers were pacifists during the War of Independence; even Benjamin Franklin, a non-Quaker Philadelphian, was characterised by a contemporary William Penn as "a dangerous man." Franklin and another Philadelphian, Robert Morris, financed the revolution, the former by negotiating loans from France, and the latter originally from his private fortune; and in the days of the revolution Philadelphia was the political centre of the young republic. In Independence Hall the Declaration of Independence was signed, and the Continental Congress sat. Here is the liberty bell, which announced that the declaration had been adopted. Close by is the old Congress Hall, the first regular home of congress, and a few streets away are Carpenters' Hall, belonging to the carpenters' guild, where the first steps in the revolution were taken in 1774, and the old house, 239, Arch Street, where Betsy Ross made the first American flag. Franklin is buried in the graveyard of Christ Church, which has colonial as well as revolutionary memories, and the Old Swedes' church of Gloria Dei occupies the site of a wooden one built in 1646. The Penn Treaty park, in Beach street, commemorates the elm under which, in 1682, Penn made his bargain with the Indians.

The city's intellectual activity has created many noted institutions, among which are the Pennsylvania academy of fine arts, the Library company, Bartram's botanical garden, the American philosophical society, the academy of natural sciences, and the Pennsylvania historical society.

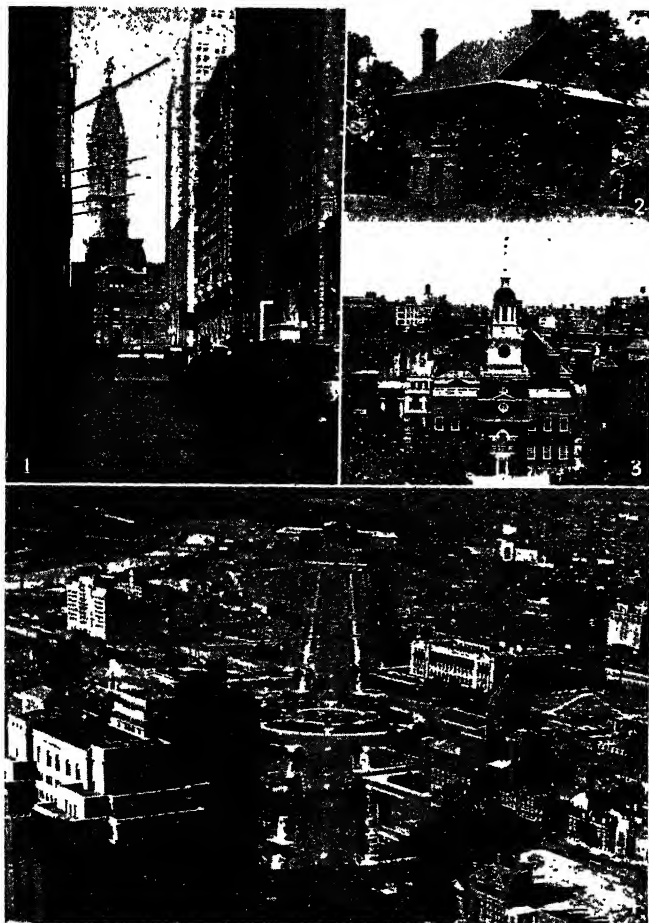
The city hall, an immense white marble structure in the French Renaissance style, covering $4\frac{1}{2}$ acres, with a tower 511 ft. high surmounted by a statue of Penn, houses the state law courts as well as the municipal offices. The masonic temple, with its

250-ft. tower, is also in City Hall Square. Among other outstanding buildings are the Stock Exchange and the Girard bank. The U.S. mint was established here in 1792. Shipyards and locomotive works are among the noted industrial establishments. The U.S. navy has a yard on League Island. The city's 30 m. of river front give it good dock facilities. The university of Pennsylvania, with 17,000 students and 1,530 professors and instructors, occupies 60 acres on the W. bank of the Schuylkill, and is famous for its medical, dental, and law schools. Girard College educates 1,500 poor male orphans according to the will of Stephen Girard (d.1831), but admits no clergyman to its grounds, and the Drexel institute, founded in 1892 by A. J. Drexel, specialises in industrial education.

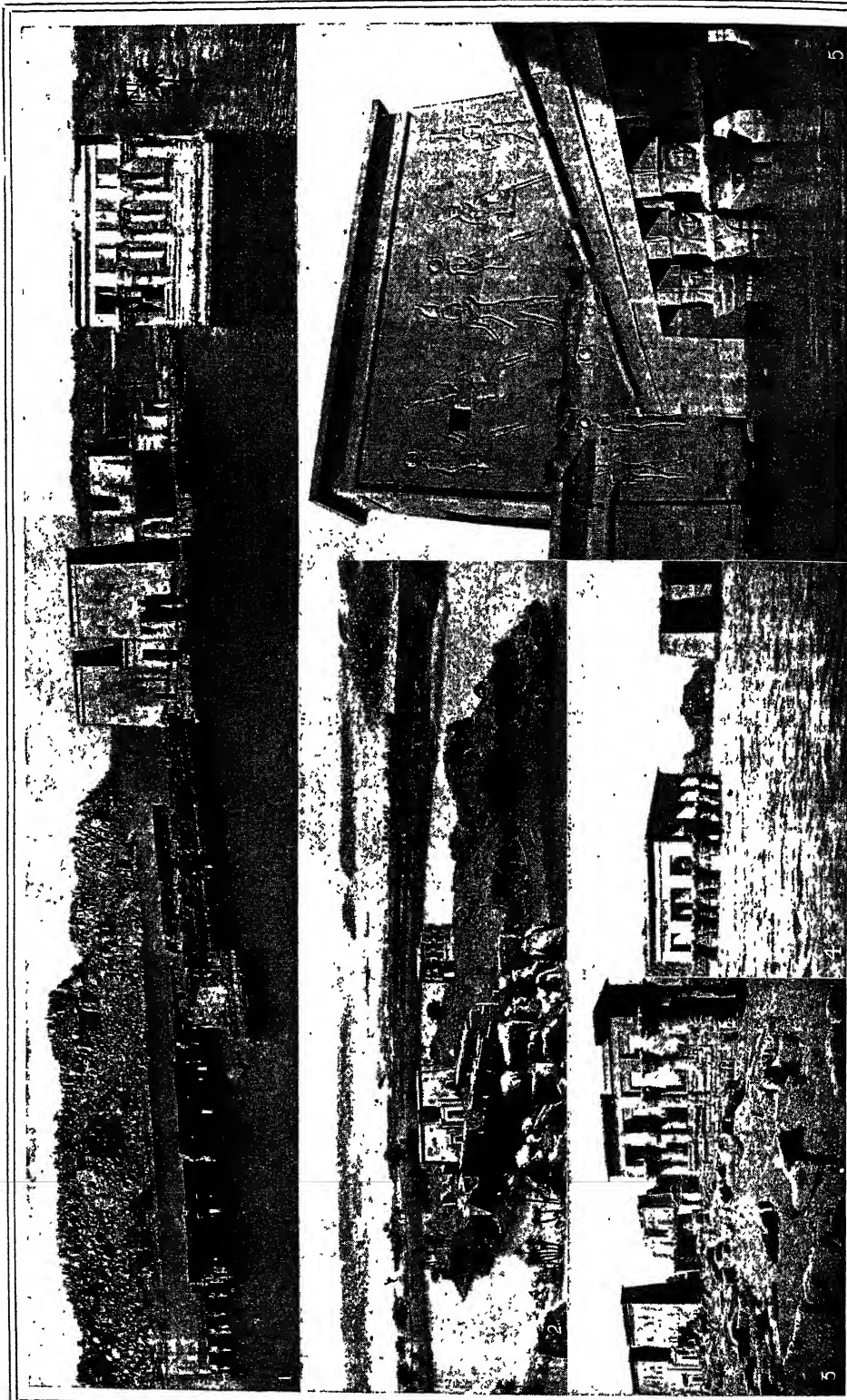
Fairmount park, Philadelphia's one big park, lies to the N.W. and contains Mount Pleasant, the country home of Benedict Arnold, and some of the buildings of the centennial exhibition of 1876. It covers 3,485 acres and extends for 10 miles along the Schuylkill river and Wissabrickon creek.

Most old and wealthy families of Philadelphia have Quaker blood. The city has 270,000 Jews; 68,000 Italian-born; 38,000 German-born; 52,000 Irish-born; 50,000 Russian-born. Negroes number 220,000, more than 11 p.c.

Lord Bryce, writing of Philadelphia early in the century, noted the frank political corruption of the city. In 1944, a U.S. senator testified to the spending of \$2,367,539, most of it contributed by rich Philadelphians, to buy votes in a political cam-



Philadelphia. 1. The city hall seen from South Broad Street; a 37-ft. high bronze statue of William Penn surmounts the tower. 2. William Penn's house in Fairmount Park. 3. Independence Hall, where the Declaration of Independence was signed. 4. The Parkway, looking N.W. from the city hall



1, 2, and 3. Views before the erection of the Assuan Dam, which partially submerged the ruins. 1. From the Cataract, standing on the right bank of the Nile. 2. From the left bank. 3. Left, ruins of the Temple of Isis, right, the Kiosk, called Pharaoh's Bed. 4. Pharaoh's Bed since submersion. 5. Forecourt of Temple of Isis, since submersion

PHILAE: PARTIALLY SUBMERGED RUINS ON THE SACRED ISLAND OF THE NILE

paign. City employees (21,000 in 1946) are proportionately far in excess of those in other large cities; through them, votes are regimented into the political machine. Lord Bryce noted the existence of Quaker democracy and simplicity side by side with a famous Philadelphia snobbery. Invitations to the yearly assembly are issued strictly according to gradations of wealth and length of residence in Philadelphia. Usages from the early days of settlement remain: e.g. the Pennsylvania Company for Insurances on Lives and the Granting of Annuities has not changed its name since it was founded early in the 18th century.

Philadelphians. Name, meaning lovers of the brethren, assumed by a sect founded late in the 17th century by John Pordage, rector of Bradfield, Berks, and Jane Lead. Their object was to put into practice the mysticism of Jacob Boehme, and they taught a form of theosophical pietism, which made contemplation the basis of religious knowledge and life. They seem to have inclined to spiritism, and apparitions of good and evil spirits were a feature in their supposed experience. See Boehme; Mysticism.

Philae. Small island in the Nile near Assuan, celebrated for its exquisite temples. Here are the small unfinished Roman hall colloquially called "Pharaoh's Bed," and two Ptolemaic structures, the Temple of Hathor and the great Temple of Isis. These buildings are now wholly submerged from Nov. to June in each year owing to the building of the dam at Assuan. See Assuan; Nile.

Philately (Gr. *philein*, to love; *ateleia*, freedom from tax). The collection and study of postage stamps, stamped envelopes, etc., is treated under Stamp Collecting.

Philby, HARRY ST. JOHN BRIDGER (b. 1885). British explorer. Born at St. John's, Ceylon, April 3, 1885, he was educated at Westminster and Trinity College, Cambridge. He joined the Indian civil service in 1908 and in 1915 went to Mesopotamia as a political officer. During 1917-18 he was in charge of the British political mission to Central Arabia, where he carried out extensive explorations, being the first European to visit the S. provinces of Nejd. Chief British representative in Transjordan, 1921-24, he became a close friend of Ibn Saud and a Muslim. Philby crossed the Rub-al-Khali desert in 1932 and travelled in the

Sheba country of S.W. Arabia in 1937. Created C.I.E. in 1917, he was elected to the council of the Royal Geographical Society in 1925, when he was awarded the first Sir Richard Burton memorial medal. He published *The Heart of Arabia*, 1922; *Arabia of the Wahhabis*, 1928; *Harun-al-Rashid*, 1933; *Sheba's Daughters*, 1939; *Arabian Days*, 1948.

Philemon (c. 360-262 B.C.). Founder of what is known as the New Greek Comedy. A native of Soli, in Cilicia, or of Syracuse, he spent most of his life in Athens. He was the contemporary and rival of Menander, to whom he was preferred by the Athenians. He wrote 97 plays, of which *The Ghost*, *The Merchant*, and *The Treasure* were adapted by Plautus in his *Mostellaria*, *Mercator*, and *Trinummus*. See Comedy; Menander.

Philemon. Friend and disciple of S. Paul. To him the apostle addressed one of the epistles belonging to the group known as the epistles of the captivity. In it he is described as a fellow worker. It is concerned with a runaway slave of his, who had become one of S. Paul's converts. The slave, Onesimus, had wronged his master and been unprofitable, and S. Paul sends him back, though he would like to keep him, and pleads for his forgiveness.

This epistle is of special interest in that it touches upon the problem of slavery, but it has been rightly pointed out that it is not an abolitionist pamphlet. Slavery is not forbidden, but is to be regulated by the Christian principle of brotherhood. The epistle is included in the Muratorian canon and the canon of Marcion. It would seem to have been written in Rome between about A.D. 60 and 62.

Philemon and Baucis. In Greek legend, an humble and aged couple living in Phrygia, who, when Zeus and Hermes visited the earth in human form and could find no one to give them hospitality, kindly received the two gods. As a reward Zeus changed their cottage into a temple, and ordained that when they died they should die together, so that one should not have the pain of surviving the other. The story is told by Ovid in his *Metamorphoses*. *Philemon et Baucis* is the title of a poem by La Fontaine, and of a three-act comic opera by Carré and Barbier, 1860, for which Gounod wrote the music.

Philharmonic Society. Association for the encouragement

of music, mainly orchestral. The chief and oldest is the Royal Philharmonic Society of London, founded in 1813. At its centenary it was granted the right to prefix the word royal to its title. Similar societies have been founded in Liverpool, New York, Brooklyn, and other places, under slightly differing names. Consult History of the P.S. of London, M. B. Forster, 1913; *Annals of the R.P.S.*, R. Elkin, 1947.

Philip. One of the Apostles. A native of Bethsaida, it was he who estimated the cost of feeding the hungry multitude that had come some distance to hear Christ preaching (John 6). The festival of SS. Philip and James is May 1.

Philip. One of the seven deacons selected by the apostles to relieve them of the work of caring for the poor. He preached for a time in Samaria, and baptized an Ethiopian eunuch of Queen Candace's court (Acts 8). June 6 is his festival.

Philip I (1052-1108). King of France. The eldest son of Henry I, he was named after Philip of Macedon, from whom his mother, a Russian princess from Kiev, claimed descent. In 1059 he was crowned as his father's successor; in 1060 he became sole king; and in 1066 his personal rule began. Though hardly as powerful as some of his vassals, he added much to the effective area of his little kingdom in a series of wars with the rulers of Normandy, Anjou, and Flanders, and other princes. Licentious and extravagant, he sold ecclesiastical benefices, and this and his bigamy led to excommunication by Urban II in 1094. He had married Bertha, daughter of Florence, count of Holland, but during her lifetime married Bertrada, wife of Fulk of Anjou. He died July 29, 1108, his eldest son succeeding him as Louis VI.

Philip II (1165-1223). King of France, known as Philip Augustus. Born Aug. 22, 1165, eldest son of Louis VII, he was crowned as joint king in 1179, marrying Isabella of Hainault and succeeding his father in the following year. His great work was the consolidation of the French monarchy. In a war with Flanders, 1184-85, he gained Amiens and Vermandois, then crushed the revolt of Burgundy, and by supporting the sons of Henry II of England against their father acquired Berry, 1189. Accompanied by Richard I, he joined the third crusade, but returned next year, took Péronne from Flanders, and in 1193 treacherously

invaded Normandy. Richard I obtained the help of Flanders, Champagne, and Brittany, 1198, but his death in 1199 brought the war to an end.

Meanwhile Philip, whose first wife had died, had wedded Ingeborg of Denmark and immediately repudiated her, 1193, marrying Agnes of Meran in 1196. France was therefore laid under an interdict until Philip took Ingeborg back. Claiming the French possessions of John of England, Philip conquered Normandy, Maine, Anjou, Touraine, and Poitou, 1204-06, and by joining in the crusade against the Albigenses gained a footing in S. France. Intervening in German affairs, he supported the

nominee Clement V, who resided at Avignon. He suppressed the Knights Templars, 1310-14, and died at Fontainebleau, Nov. 29, 1314. Philip was a man of great personal courage, but despotic, cruel, and unscrupulous.

Philip V (c. 1294-1322). King of France. A younger son of Philip IV, he became king in Nov., 1316. For a few months he had been regent, waiting for the birth of a posthumous son to his brother, Louis X, but the child lived only a few days. His rival was Jeanne, a daughter of Louis, but the succession of a woman was disliked and Philip secured the throne. He did much for France by way of useful legislation, and was a man

himself of one regent and recalled Philip to assist in the government. In 360 Perdicas was killed in a conspiracy, leaving an infant son. Philip brought home with him the ideas of war and government, and the admiration for Hellenic culture, which he had acquired in his boyhood, and the resolve to make Macedon first of Hellenic powers.

It was an easy matter in 359 to set the crown on his own head instead of that of the infant king. The next step was to bring the Macedonian army under discipline and organization which would make it a first-rate instrument of war. Philip created the Macedonian phalanx, modelled upon the infantry system of Epamin



Philip, kings of France. Left to right: Philip I, 1059-1108; Philip II, 1187-1223; Philip III, 1270-85; Philip IV, 1285-1314; Philip V, 1316-22; Philip VI, 1328-50

Flemish communes, with whose aid he won the great victory of Bouvines over the emperor Otto IV, England, and Flanders, July 27, 1214. His position being now assured, he reformed the administration and judiciary and improved the city of Paris. The greatest organizer among medieval French monarchs, he died July 14, 1223. *Consult Life*, W. H. Hutton, 1896.

Philip III (1245-85). King of France, called the Bold. The son of Louis IX, he was born April 3, 1245, and began to reign in 1270. His personality was colourless and his reign uneventful. No great warrior, in 1284 he engaged in an unsuccessful struggle against Aragon, and this period was marked by the struggles of factions for the mastery. Philip died Oct. 5, 1285.

Philip IV (1268-1314). King of France, called the Fair. Son of Philip III and Isabella of Aragon, he was born at Fontainebleau, married Joanna of Navarre, 1284, and succeeded his father, 1285. In 1293 he ordered Edward I of England to do homage before him, and war broke out with England, 1294-99. Having treated Flanders as a French dependency, Philip was utterly defeated by the Flemish at Courtrai, 1302. At this time began his great quarrel with the papacy over the taxation of the clergy, and in 1302 he burned the bull of Boniface VIII, whom he arrested, 1303, replacing him in 1305 by his own

of some culture and a patron of Provençal poets. He died Jan. 2, 1322, but left no sons, his successor being his brother, Charles IV. Philip is known as the Tall.

Philip VI (1293-1350). King of France, first of the Valois line. Son of Charles of Valois, brother of Philip IV, he was made regent, 1328, and in the same year became king by the Salic law. He defeated the Flemings at Cassel, and in 1329 received the homage of Edward III of England for Guienne, but the Hundred Years' War with England broke out in 1337. Philip suffered his greatest defeats at Sluys, 1340, Crecy, 1346, and Calais, 1347, but by accession and purchase he extended his dominion to Valois, Anjou, Champagne, Brie, and Dauphiné. Disastrous wars and extravagance drained his exchequer, so he depreciated the coinage and taxed salt. Died Aug. 22, 1350.

Philip II (382-336 B.C.). King of Macedonia. The younger son of Amyntas II, he was brought up not in his native country but at Thebes (q.v.) in the brief days of her glory, when Epaminondas was the foremost man in the state. In 364 his brother Perdicas rid

ondas, and he added to it the cavalry organization which gave the combined arms an overwhelming superiority over the traditional Greek tactics. A statesman as well as a soldier, he made himself master of the coastal districts which he needed to provide him with a revenue. During 352-347 he seized territory on the coast of Thrace, invaded Thessaly, and destroyed Olynthus. Meanwhile an aggressive power had arisen in Phocis (q.v.); an act of sacrilege on the part of the Phocians, which stirred the religious sentiment of all Hellas, gave Philip his opportunity for intervention. He crushed the Phocians, and claimed admission in their place into the Hellenic circle, 346.

Philip next subjugated Balkan tribes N. of Macedonia. Athens took alarm at his growing power, when he found further pretexts for intervention in Greek affairs; the Athenians and Thebans united to oppose him, but were decisively beaten at Chaeronea, 338. At a great congress of the Greek states, from which Sparta alone held aloof, Philip was elected captain-general in 337. At once he set about organizing the great invasion of Persia; but before he could start he was struck down by the hand of an assassin at Aegae.

Philip V (c. 237-179 B.C.). King of Macedonia. On the death of his father Demetrius II,



Philip II, King of Macedonia. From a coin in the British Museum

antigonus Doson ruled until Philip reached the age of 17, when the regency ended. The beginning of Philip's responsible reign was



Philip V,
King of Macedonia
From a coin

marked by a war with the Aetolians, which he conducted with great success. In 215 he concluded an alliance with Hannibal, in consequence of which the Romans formed a combination against him in 211, including the Aetolians and Pergamum. This combination kept Philip busy fighting until 205. War was renewed by the Romans in 200, and in 197 Philip was completely defeated by Flaminius at the battle of Cynoscephalae. By the terms of peace Philip renounced all territorial acquisitions outside Macedonia, and agreed to pay an indemnity of £240,000 and to limit his army to 5,000 men.

Philip I (1478-1506). King of Spain. Son of the emperor Maximilian I, and Mary, daughter of Charles the Bold, duke of Burgundy, he was born at Bruges, July 22, 1478. In 1482 he became by his mother's death the nominal ruler of the possessions of the dukes of Burgundy, and in 1496 he married Joanna, the deranged daughter of Ferdinand and Isabella of Spain. After Isabella's death, in 1504, he and his wife were recognized as king and queen of Spain, but soon afterwards Philip died at Bruges, Sept. 25, 1506. Known as the Handsome, he was the father of Charles V.

Philip II (1527-98). King of Spain. He was born May 21, 1527, the son of the emperor Charles V. In 1543 he married Mary of Portugal, and after her death Mary I of England, in 1554. In 1556 his father abdicated, transferring to him the lordship of the Netherlands, together with the crowns of Spain and of the Two Sicilies and the whole Spanish colonial empire, though the German possessions of the house of Hapsburg had already been handed over to Philip's uncle Ferdinand, who succeeded Charles as Roman emperor. On Mary's death Philip offered his hand to her sister and successor, Elizabeth; the offer being declined, he forthwith married the French princess Elizabeth. His fourth wife, from 1568, was Anne of Austria.

After the peace of Cateau-Cambrésis, 1559, Philip ruled terri-

tory immensely larger than that of any other potentate; his weakness lay in the fact that its three main divisions in Europe had no intercommunication by land. He looked upon himself as the champion of the Catholic faith, but as the senior rather than the junior partner of the pope in the task of compelling heretics of all nations to return to the bosom of the Church. His resolution never wavered, his industry was enormous, his piety and conscientiousness were great. But conscience did not forbid him to countenance assassination, the most portentous cruelty, or duplicity in attaining his ends. His industry was marred by a total incapacity for trusting any man who showed ability; his resolution was made futile by slowness, stubbornness, inefficiency, and a persistent belief that when his time came he would strike irresistibly, the result being that his time never did come, because his enemies struck first. The Netherlands revolted under William the Silent. Philip deferred an open rupture with England while she was weak; when in 1588 he delivered what should have been his crushing blow at the island power, his Great Armada was shattered

no knowledge of public affairs. He married in 1599 Margaret of Austria, daughter of the Archduke Charles. The duke of Lerma, who acquired the whole power of the state, provided the king with money and amusement, gave over the finances to courtiers, and pursued the grandiose policy of Philip II with insufficient and dwindling resources. Peace was indeed made with England in 1604, but the war in the Netherlands was continued until 1609. A pious son of the Church, Philip determined to exile from Spain in 1609 the whole Moorish population except Christians and young children. The loss of their labour ruined agriculture and commerce. Philip died March 31, 1621.

Philip IV (1605-65). King of Spain. Born at Madrid on April 8, 1605, the son of Philip III and Margaret of Austria, he succeeded his father at the age of 16. Lerma was dismissed, and Philip, provided with an endless succession of amusements, leaned on the count of Olivares (*q.v.*), who by his aggressive foreign policy brought Spain to the verge of ruin. When at last, after the loss of Portugal and Roussillon, French armies were in Spain, Philip roused himself to dis-



Philip, kings of Spain. 1. Philip I, 1504-1506. 2. Philip III, 1598-1621. 3. Philip II, 1556-98. 4. Philip IV, 1621-65. 5. Philip V, 1700-46.

3 Titian. 4. Velazquez 5. Rigaud

to fragments. Supporting the Catholic League against Henry of Navarre, he failed again. The sole success of the reign was the annexation of Portugal. Philip died Sept. 13, 1598. Consult *History of the Reign*, W. H. Prescott, 1887; *Lives*, M. A. S. Hume, 1897; D. Loth, 1932; W. T. Walsh, 1938.

Philip III (1578-1621). King of Spain. Born at Madrid, April 14, 1578, the son of Philip II and of Anne of Austria, he came to the throne, Sept. 13, 1598. Of naturally weak ability, he had acquired

miss his minister, but was incapable of sustained effort. His armies were defeated by the French under Condé at Rocroi and at Lens, and Spain was compelled to recognize the independence of the United Provinces.

Philip sought in vain in two expeditions to recover Portugal. His reign, though in other respects disastrous, was a brilliant period for art and letters, in both of which the king was a real connoisseur. Velazquez was his court painter. Philip died in Madrid, Sept. 17,

1665. By his first wife, Elizabeth of France, he had six children, only one of whom survived, Maria Theresa, married to Louis XIV of France; by his second marriage, with Maria Anne of Austria, he left a son, Charles II, who succeeded him, and a daughter, Margaret Theresa, who married Leopold I of Austria.

Philip V (1683-1746). King of Spain. Born Dec. 19, 1683, he was the son of Louis, the dauphin of France, and grandson of Louis XIV. On the death of Charles II of Spain in 1700, he was declared heir to the throne of Spain and the whole of the Spanish empire. The inheritance was accepted by Louis XIV and the result was the War of the Spanish Succession (*q.v.*). In the end Philip was recognized as king of Spain, though the Netherlands and the Two Sicilies were separated from the Spanish empire. Spanish affairs were for a short time guided by Cardinal Alberoni, whom Philip was compelled by the European powers to dismiss in 1719; the real director of policy, however, was Philip's queen, Elizabeth Farnese. By joining in the War of the Polish Succession she obtained for her sons dominions in Italy. Philip abdicated in favour of his son Louis in 1724, but on his death a few months later re-ascended the throne, living until July 9, 1746.

Philip (1342-1404). Duke of Burgundy, called the Bold. Son of John II of France, he was born on Jan. 15, 1342, was captured with his father at Poitiers, 1356, and was made duke of Burgundy in 1363. He married Margaret of Flanders in 1369, took part in the English wars, and having defeated the insurgent Flemings at Roosebeke, Nov. 27, 1382, became in 1384, through his wife's inheritance, joint ruler with her of Flanders, Franche Comté, and other districts. In 1392 he became regent for Charles VI of France. He died April 27, 1404, and was succeeded by John the Fearless.

Philip (1396-1467). Duke of Burgundy, called the Good. Son of John the Fearless and Margaret of Bavaria, he was born at Dijon, June 13, 1396, and succeeded his murdered father in 1419. He made an alliance with Henry V of England, but quarrels with the duke

of Bedford led to his withdrawal from the campaign, and he made peace with Charles VII, 1429. The same year he married Isabella of Portugal and instituted the Order of the Golden Fleece. He renewed hostilities, captured Joan of Arc at Compiègne, and finally made the treaty of Arras, Sept. 21, 1435, recognizing the king of France as his suzerain. He suppressed the insurrection of Ghent, 1448-53, supported the dauphin Louis against Charles, 1456, and died at Bruges, July 15, 1467. A patron of learning and arts, in 1421 he founded the university of Dôle.

Philip, PRINCE, DUKE OF EDINBURGH (b. 1921). British prince. Son of Prince and Princess Andrew



Philip the Good, Duke of Burgundy



Prince Philip, Duke of Edinburgh

of Greece, Philip, prince of Denmark and Greece, was born at Corfu, June 10, 1921. A great-grandson of Queen Victoria, he came to England at an early age, where he was brought up by his uncle, later Viscount Mountbatten of Burma. Educated at Cheam School, and Gordonstoun, Scotland, he entered the R.N. College, Dartmouth, at 18. In 1940 he became a midshipman in H.M.S. Ramillies, and was present at the battle of Matapan, 1941, later serving in the Pacific. After the war he became instructor at the petty-officer training establishment at Corsham, Wilts. He became a naturalised British subject, March, 1947, relinquishing his princely titles, and taking the surname of Mountbatten (his mother's family). His engagement to Prin-

cess Elizabeth was announced July 10, 1947. Created duke of Edinburgh, K.G., and a British prince with the style of His Royal Highness, Nov. 19, he married Princess Elizabeth at Westminster Abbey, Nov. 20. Their first child, Prince Charles, was born a year later. Prince Philip was first-lieut. on a destroyer, 1949, and in 1950 was promoted lt.-cdr. and given command of a frigate. He was president of the National Playing Fields Association from 1948, and of the M.C.C., 1949-50.

Philippaugh. Battlefield near Selkirk, Scotland. Here, Sept. 13, 1645, the marquess of Montrose (*q.v.*) was defeated by the parliamentarians under David Leslie. After routing the Covenanters at Kilsyth, Montrose had advanced to the Border. Leslie marched from Nottinghamshire and surprised him at Philippaugh, Montrose fleeing to the Highlands. The victory was stained by a massacre of Irish prisoners and women.

Philippa of Hainault (c. 1314-69). Queen of Edward III of England. Their marriage, Jan. 30, 1328, gave Edward a claim to the alliance of her father, William, count of Holland and Hainault, against the French. In 1330 Philippa bore her first child, Edward, the Black Prince. She was with the king in 1347 at the siege of Calais, where on her intercession he spared the lives of six burgesses who came to yield up the city. Froissart became her secretary in 1361. She died at Windsor Castle, Aug. 15, 1369, having borne seven sons and five daughters. Queen's College, Oxford, was called after her.

Philippeville. Port of Algeria, forming the main entrance to the prov. of Constantine. The city, founded by the French in 1838, is entirely European in character, but stands on the site of an ancient city which has been identified with the Rusica of the Romans. It is a railway terminus, lying 54 m. N.N.E. of Constantine, handles much of the trade of E. Algeria and the Sahara, and has steamer connexion with Algiers and Marseilles. In the neighbourhood wheat, tobacco, cotton, and fruit are produced, iron is mined, and granite quarried. Pop. 64,857.

Philippi. City of ancient Macedonia. Founded by Philip of Macedon, it was situated on a spur of Mt. Pangaeus near the river Gangas. Its gold mines are mentioned by Herodotus, but it is chiefly important historically as the scene of the battle in which Brutus and



Philip the Bold, Duke of Burgundy

Cassius were defeated, 42 B.C., after which it became a Roman colony. One of the first Christian churches was founded here by the Apostle Paul, whose letter to the inhabitants is included in the N.T. See *Philippians*.

Philippi, BATTLE OF. Term applied for convenience to two separate battles fought in 42 B.C. near Philippi in Macedonia between the forces of Brutus and Cassius on one side, and those of Octavian, Caesar's grandnephew and heir, and Antony. In the first battle the wing of Cassius was defeated and the general killed himself, while the wing of Brutus was victorious. In the second battle, 20 days later, Brutus was defeated and committed suicide, and his army was annihilated. The result of the battle was to make Octavian and Antony masters of the Roman world. Philippi is the scene of the last act of Shakespeare's *Julius Caesar*.

Philippians, EPISTLE TO THE. One of the epistles of S. Paul, belonging to the group known as the Epistles of the Captivity. Its authenticity may be said to be fully guaranteed by external evidence. It is included in the Canon of Marcion and in the Muratorian Canon, is referred to by Polycarp, and was accepted by Irenaeus. The internal evidence is equally strong, the epistle bearing unmistakably the stamp of S. Paul's character. It is addressed from prison to the Church of Philippi, which S. Paul founded on his second missionary journey. Since the imprisonment was probably in Rome, rather than in Caesarea, the epistle may be assigned to A.D. 63. It is a very personal letter, expressing S. Paul's thanks for gifts and other friendly acts, and his great joy in the Gospel, and exhorting the Philippians to rejoice with him.

Philippics. Series of speeches delivered by Demosthenes (q.v.) from 351 to 341 B.C. They were so called because their purport was to warn his countrymen against the designs cherished by Philip of Macedon for the overthrow of Greek independence. The speeches contain a great deal of violent personal invective. The name *Philippics* was also given to 14 orations of Cicero against Mark Antony.

Philippine Islands. Extensive group of islands in the N. part of the East Indies, formerly belonging to the U.S.A., but since July 4, 1946, constituting an independent republic. They number more than 7,100, and with the Sulu Is. cover a land surface of 114,830 sq. m. The principal islands are Luzón,

Mindanao, Palawan, Negros, Panay, Samar, Mindoro, Bohol, Cebú, Leyte, and Masbate. Manila is the capital and the leading industrial and commercial centre.

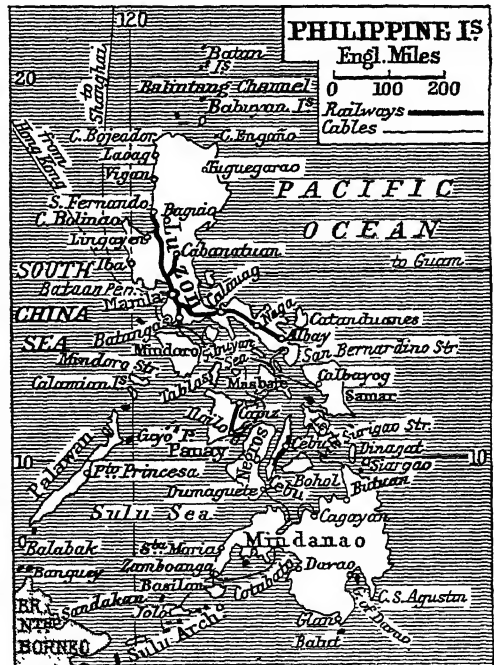
Mainly of volcanic origin, the Philippines are traversed by magnificent and irregular mt. ranges, well clothed with vegetation and separated by plains of great fertility, watered by innumerable lakes and rivers, which afford ample means of transport. The general disposition of the mts. is from N. to S. Parallel with the E. coast of Luzón runs the Sierra Madre, a range extending from the N. point to near Manila and averaging from 3,500 ft. to 4,500 ft. alt. On the opposite side of the island are the Caraballos Occidentales, which attain in Mt. Datá a height of 7,364 ft. Between the two ranges is the fertile valley of the river Cagayán, noted for its tobacco. Apo or Davao, 10,312 ft., an extinct volcano in Mindanao, is the culminating summit.

Several of the rivers and lakes are of considerable size. Cagayán, in Luzón, is the longest river, others being the Agno Grande and Abra, in the same island, and the Pulangua or Rio Grande de Mindanao and the Agusan in Mindanao. Liguasan, Buluan, and Lanao in Mindanao, and Laguna de Bay, Cagayán, and Taal, in Luzón, are the largest lakes.

The climate is tropical, but on the whole not unhealthy. Rain from the S.W. monsoon falls between June and Sept. on the W. coasts, and from Oct. the N.E. trades bring rain to the E. coasts. Typhoons of great violence are most frequent from July to Oct. At Manila the mean annual temperature is 80° F. and the rainfall 80 ins. The indigenous flora is generally similar to the Malayan, with the addition of some more N. varieties, and also a few Australian genera. Large forests of teak, ebony, sandal, and other

useful woods occur, and among valuable plants are the Manila hemp, gomuti palm, pineapple, cotton, tea, coffee, cocoa, indigo, sugar-cane, tamarind, and tobacco. Nutmeg, cassia, clove, and pepper also abound. Rice is cultivated, and maize, wheat, yams, bananas, oranges, lemons, and other tropical fruits are produced. The buffalo is the largest wild mammal, others being antelopes, boars, deer, and monkeys; and among domestic animals are the horse, goat, sheep, and hog. In the woods eagles, herons, wild duck, and many other birds are found, and crocodiles infest the rivers.

Gold is one of the most valuable mineral products, and silver, copper, lead, iron, platinum, and manganese are worked. Mining installations were badly damaged during the Japanese occupation. Among the volcanoes sulphur occurs in considerable quantities. Industries include the cultivation and manufacture of abaca or Manila hemp and the manufacture of tobacco and cigars. Pearls and edible birds' nests are a valuable item of trade with China. In the production of copra and coconut oil the islands rank high among world sources. The Negritos, a pygmy race giving its name to the island of Negros, but inhabiting



Philippine Islands. Map of this Pacific group forming an independent republic, formerly belonging to the U.S.A.

the mountainous districts of the other islands as well, are regarded as the aborigines. The bulk of the people are Malays, the chief types being Tagals in Luzón, and Visayans in the other islands. The official national language is Tagalog, a Malayan dialect. The dominant religion is Roman Catholicism. Pop. 16,971,100.

The Philippines were discovered in 1521 by Magellan, who was shortly afterwards killed during a skirmish on Mactan Island, and were annexed by Spain in 1569, after several expeditions had been made. Manila, which became the Spanish capital in 1571, was occupied by the British, 1762-64. The islands remained a Spanish possession until 1898, when they were ceded to the U.S.A. as a result of the Spanish-American War. Aguinaldo led the Filipinos in a revolt against the Americans which was virtually ended by his capture in 1901. Later a movement for self-government was started by the Filipinos, and on March 24, 1934, F. D. Roosevelt signed an act of congress conferring independence on the Philippines after a 10-year transitional period. As a result of the Second Great War, this period was extended to 12 years.

Bibliography. The Philippine Islands, 55 vols., E. H. Blair and J. A. Robertson, 1903-09; The Philippines Past and Present, D. C. Worcester, 1914; The Philippine Problem, W. H. Anderson, 1939; The Philippines: A Study in National Development, J. P. Hayden, 1942; The Philippine Islands, W. C. Forbes, 1946.

SECOND GREAT WAR. When war in the Pacific began General MacArthur, U.S. commander in the Philippines, had at his disposal some 50,000 men who were, apart from the 31st Infantry, the 4th Marine regt., the Philippine Scouts, and a few companies of national guardsmen, Filipino reservists, poorly armed, equipped, and trained. The Japanese had a large and active fifth column throughout the islands. Political intrigue, both internal and external, combined with apathy in Washington, had left the Philippines almost as helpless as Pearl Harbour.

On Dec. 8, 1941, Japanese bombing raids on Clark Field and Iba airfield eliminated the main strength of the U.S. army air force in the Philippines.

Nichols Field, base for the fighter defence of Cavite naval dockyard, and the airfield at Davao were destroyed very early on Dec. 9; and on the same day Cavite itself

was bombed, the destruction of shore installations depriving the U.S. navy of its only operational base in the Philippines. Most of the U.S. surface vessels were withdrawn to Java, but a few submarines continued to operate against Japanese transports in Philippine waters.

On Dec. 10 the Japanese began landing troops between Vigan and Aparri on the N. and N.W. coasts of Luzón, and after an initial repulse firmly established themselves. One force which landed at Legaspe, in S.E. Luzón, Dec. 13, could not be dislodged. On Dec. 20 landings were effected on Mindanao (*q.v.*). On Dec. 22, a fleet of 80 transports strongly supported by air and naval units landed some six divs. of infantry and armour along the gulf of Lingayen, 125 m. N.W. of Manila, and despite heroic resistance by U.S. and Filipino troops made considerable headway.

With the Japanese rapidly advancing S. from Lingayen, and enjoying undisputed control of the air, Gen. MacArthur had no alternative but to fight delaying actions to cover a withdrawal into Bataan Peninsula (*q.v.*). This followed the official U.S. plan drawn up before the invasion, which, however, assumed that Bataan could hold out for two months until the arrival of reinforcements from the U.S.A. The disaster at Pearl Harbour and Japanese attacks on other U.S. mid-ocean bases had, however, eliminated the possibility of reinforcement.

MacArthur's Withdrawal

Withdrawal to Bataan had actually begun on Dec. 21, and the rapid advance of the enemy threatened to turn the U.S. left flank. A Filipino-U.S. force made a stand along the Agno river and managed to draw off the main Japanese force, so enabling Maj.-Gen. Wainwright, Gen. MacArthur's second in command, to continue the retreat, under constant attack but in good order, and with his supplies and limited armour intact.

Further landings at Antomonan, at Mauban on Lamon Bay and at Nasugbu, 15 m. from Manila bay, resulted in heavy Japanese pressure towards Manila (*q.v.*). A U.S. counter-attack near Laguna de Bay on Dec. 25 failed, and gave the Japanese a clear route to the Philippine capital, declared an open city on Dec. 25, but severely raided from the air before it was entered by the Japanese Jan. 2, 1942. The U.S. withdrawal into Bataan was completed early on new year's day. After three weeks' fighting, the remnants of the U.S.

troops were forced into the islet fortress of Corregidor (*q.v.*).

On Feb. 11, Washington announced that the Japanese had occupied Masbate, central island of the Philippine group. Landings were made on Mindoro (*q.v.*) on March 6, followed by the occupation of the islands of Masharu and Homma. Sporadic fighting continued on many of these islands until the garrison in Corregidor surrendered on May 6, when organized resistance ceased throughout the Philippines, although guerrilla activity continued on many of the 7,000 islands of the group.

MacArthur transferred his command to Lt.-Gen. Wainwright and left Bataan for Australia on March 11, 1942, promising to come back: he insisted already that recapture of the Philippines was essential to an invasion of Japan.

Return of American Forces

The capture of Morotai in the Moluccas (*q.v.*) on Sept. 17, 1944, and of Peleliu in the Palaw group on Oct. 1, in MacArthur's island-hopping campaign across the Pacific had brought U.S. forces within striking distance of the Philippines; and after an initial air and sea bombardment, elements of Gen. Krueger's U.S. 6th army went ashore at Leyte (*q.v.*) on Oct. 20. The original U.S. plan had been to invade Mindanao in Nov., but Japanese weakness in aircraft over Leyte revealed by air combats led to the bringing forward of the date of attack and the changing of the objective to that island. Moreover, the Japanese, anticipating attack on Mindanao, had heavily fortified and garrisoned it.

Within a few hours of their first landings in the Tacloban area of Leyte, the Americans had over 100,000 men ashore and had captured Tacloban and Dulag airfields. By Oct. 22 beachheads were established on the N. coast, giving control of the San Juanico Strait separating Leyte from Samar, where landings were made on Oct. 27. Although a typhoon interfered with operations, the whole E. coast of Leyte was in U.S. hands by the 30th, and nearly the whole of Samar had been liberated. The Japanese navy made desperate efforts to interfere with the U.S. transports and to bring reinforcements from Mindanao and other Philippine islands, but the virtual elimination of the Japanese navy in the sea battles of Oct. 23-27 prevented any large scale Japanese reinforcement. All organized Japanese resistance on Leyte ended on Dec. 25. The capture of Leyte cost

the U.S. forces 2,623 killed and 8,422 wounded; the Japanese lost 113,221 men.

On Dec. 15, U.S. troops went ashore at Mindoro at a point 300 m. N.W. of Leyte and only 75 m. S. of Manila. The landing met with but slight opposition, and the capture of the island by Dec. 29 virtually cut the Philippines in two.

After a feint towards the Verde Is. Passage, S. of Manila bay, designed to give the Japanese commander, Gen. Yamashita, the impression that an assault was about to be made in Batangas area, the U.S. 14th army corps, led by MacArthur in person, landed on the coast of the Lingayen gulf on Jan. 9, 1945, while the 1st army corps simultaneously went ashore at Damortis. The only opposition offered either landing was by pilots of the *Kamikaze* (suicide corps). The Japanese land forces in Lingayen and the central plain withdrew to the surrounding mountains, and the U.S. 37th infantry moved down the central plain towards Manila, capturing Clark Field by Jan. 25. Additional landings were made near Subic bay, Bataan. By Feb. 6, U.S. troops had recaptured Manila, except for the old walled city of Intramuros across the river Pasig, which fell on Feb. 24. Other Japanese formations were rapidly eliminated, Bataan being cleared and Corregidor recaptured on Feb. 16.

With the fall of Manila, Japanese rule in the Philippines ended, but U.S. landings on other islands continued: on Palawan, March 1; Mindanao, March 9; Panay, March 19; Cebu, March 26; Busuanga, April 11, to deliver medical supplies and food to the leper colony at Culion; Bohol, April 13. Only on Cebu did these later landings meet serious resistance; when Cebu was conquered on April 23, resistance was confined to that of isolated groups on Luzon and Mindanao.

On July 5 MacArthur announced that, of the 450,000 Japanese in islands, all but 30,000 men had been annihilated; 17 U.S. divs. had been engaged, and casualties were 54,891, of whom 11,921 had been killed.

Lt.-Gen. Tomoyuki Yamashita, the "tiger of Malaya," conqueror of Corregidor and of Singapore, unconditionally surrendered himself and all remaining Japanese forces in the Philippines to Lt.-Gen. Wainwright (who had surrendered to Yamashita at Corregidor), Sept. 3, 1945. See Pacific War, 1941-45.

David Le Roi

Philippopolis. Old name of the Bulgarian city now usually known as Plovdiv (*q.v.*).

Philippus, MARCUS JULIUS. Roman emperor, A.D. 244-249, often called Philip the Arabian. He was commander of the army which the emperor Gordian III led against the Persians, and incited a mutiny, as a result of which Gordian was murdered, and Philippus was proclaimed his successor. He concluded an ignoble peace with the Persians and celebrated, 248, with secular games of unprecedented magnificence the 1000th anniversary of the founding of Rome. He was slain at Verona by Decius (*q.v.*).

Philips, AMBROSE (c. 1675-1749). English poet. He was born in Shropshire and educated at Shrewsbury and St. John's College, Cambridge. Philips was the author of some indifferent odes, of a tragedy, *The Distressed Mother*, and of some pastorals. He was friendly with Addison and Steele, but incurred the enmity of Pope, who satirises his poems in *The Dunciad*. He died in London, June 18, 1749. The word namby-pamby was coined from his name by H. Carey (*q.v.*).

Philips, JOHN (1676-1709). An English poet. He was born at Bampton, Oxon, Dec. 30, 1676, and educated at Winchester and Christ Church, Oxford. His best known work is *The Splendid Shilling*, a mock-heroic poem which parodies the style of *Paradise Lost*. He died Feb. 15, 1709.

Philistia (Heb. *Peleseth*). O.T. name for the land of the Philistines (Ps. 60, v. 8; 87, v. 4; 103, v. 9). Elsewhere it is rendered *Palestine* (*q.v.*), and it does not occur in either LXX or Vulgate. The land embraced under this name included the coast plain S.W. of Palestine, from Joppa N. to the valley of Gerar S., and from the Mediterranean in the W. to the foot of the Judean hills.

Philistines. Ancient people living along the coast of Palestine. They came from Crete and the Anatolian coast, and established themselves in five cities in Palestine—Gaza, Ascalon, and Esdud on the coast, and Gath and Ekron inland. For a long period down to the reign of Saul they were the dominant race in Canaan. They were intermittently at war with the Hebrews, and were greatly reduced in power by David, but they retained their independence till their subjugation was begun by Tiglath-pileser, 734 B.C., and completed by Sennacherib, 701.

Modern research, by elucidating their racial relationships and culture, has demolished the figment of their artistic insensibility. The main evidences are the Phaestus disk (*q.v.*), the temple-carvings of Rameses III at Medinet Habu (1200 B.C.), and the Gezer and Bethshehem excavations. They dominated the neolithic inhabitants by their knowledge of metals and their early monopoly of iron. The longest Philistine skeleton from Gezer is 6 ft. 3 ins. Their social organization was based on a confederacy of chieftains (*seven*) of early Aryan type (Judges 16). Their non-Semitic speech lingered at Ashdod down to Nehemiah (445 B.C.). See Archaeology; Dagon; Palestine; consult also *The Philistines*, R. A. S. Macalister, 1913.

In the sense of a narrow-minded, uncultured person, the term Philistine became current in English through its adoption from the German by Matthew Arnold. *Philister* is a slang term used by German students for any person not a student.

Philistus (c. 435-356 B.C.). Greek historian. He was born at Syracuse, and was a close friend of Dionysius the Elder until 386, when he was banished for having secretly married the tyrant's niece. He spent the next twenty years in exile, and during that time wrote a history of Sicily, which is mentioned with warm approval by Cicero. On the accession of Dionysius the Younger in 366, Philistus returned to Syracuse, and at the capture of the city by Dion, 356, he went to Italy to raise a force, rejoined Dionysius, and was killed in a naval battle.

Phillimore, WALTER GEORGE FRANK PHILLIMORE, 1ST BARON (1845-1929). British lawyer. Born



1st Baron Phillimore, British lawyer

in London, Nov. 21, 1845, he was the son of Sir R. J. Phillimore, Bt. (*v.s.*). Educated at Westminster School and Christ Church, Oxford, he was made a fellow of All Souls and became a barrister. In 1897 he was made a judge, and from 1913-16 was a lord justice of appeal. He was created a peer in 1918. An authority on ecclesiastical law, Phillimore revised J. J. Blunt's *Book of Church Law*. From 1905 to 1908 president of the International Law Association, he died March 13, 1929, being

succeeded by his eldest surviving son, Godfrey Walter Phillimore (1879-1947). On the latter's death in Dec., 1947, the title passed to the 2nd baron's grandson, Robert Godfrey Phillimore (b. 1939).

Phillimore, Sir Robert Joseph (1810-85). British judge. Born at Whitehall, Nov. 5, 1810, educated at Westminster and Christ Church, Oxford, and called to the bar at the Middle Temple 1841, he obtained a considerable practice. He entered parliament in 1852 for Tavistock, and soon acquired a reputation as an authority on ecclesiastical and international law. He was made Q.C. in 1858 and a knight in 1862. In 1867 he was appointed judge of the high court of admiralty, where he delivered many important judgements. He wrote commentaries on International Law, 4 vols., 1854-61, since revised. Created a baronet, 1881, he died Feb. 4, 1885.



Sir Robert Phillimore, British judge

Phillip, Arthur (1738-1814). British sailor and administrator. Born in London, Oct. 11, 1738, he was educated at Greenwich and in 1755 entered the Royal Navy as a midshipman. In 1756 he served under Byng in the Mediterranean, and in 1761 went to the West Indies, where he was promoted lieutenant. After the peace of 1763 he served for some years with the Portuguese navy, but on the outbreak of war between Britain and France in 1778 rejoined the Royal Navy and was promoted captain the following year. In 1786 he was sent to Australia to establish a convict settlement there. He reached Botany Bay on Jan. 18, 1788, but decided to found the settlement at Port Jackson. This eventually developed into the present city of Sydney. He later established a settlement on Norfolk Island, 930 m. north-east of Sydney, and carried out a number of explorations along the coast. Appointed first governor of the settlement in 1791, he retired in 1793 and returned to England. He was promoted vice-admiral, 1810, and died at Bath, Aug. 31, 1814.

Phillip Island. Islet of Victoria, Australia. With an area of 14 m. by 6 m., it lies off the entrance to Western Port Bay. It was named after the first governor of N.S.W., Arthur Phillip (v.s.).

Cowes, the chief place, is on the N. coast.

Phillips, Sir Lionel (1855-1936). British financier. Born in London, Aug. 26, 1855, he went to South Africa at 20 and engaged in the diamond industry. His first large-scale activity was to buy for £10,000 half the Bonanza mine. He soon became a leading figure in South African diamond and gold mining. He was a leader of the Jameson raid, for his part in which he was condemned to death; but his sentence was commuted to a fine of £25,000, a decree of banishment being remitted on his undertaking to abstain from political activity. Five times president of the Transvaal chamber of mines, he was elected in 1910 to the first parliament of the Union, and with the First Great War became controller of the department for the development of mineral resources under the ministry of Munitions. In 1913 he was severely wounded during a strike on the Rand. His baronetcy dated from 1912. He retired from the chairmanship of the Central Mining Corporation in 1924, and died, July 2, 1936. His account of his life, *Some Reminiscences*, was published in 1924.

Phillips, Stephen (1866-1915). British poet. Son of Dr. Stephen Phillips, precentor of Peterborough Cathedral, he was born July 28, 1866, and educated at Stratford and Peterborough grammar schools. He went on the stage and played many parts in Benson's company. He later became an army tutor.

His first volume of poems, *Marpessa*, 1890, brought him exceptional popularity. He wrote apparently for declamation and had no ear for lyrical measures, but his imaginative language and warm colouring took his readers by storm. Later that very experience in stagecraft, which limited his rhythms, inspired the daring originality of *Paolo and Francesca*, 1899, a drama in verse, the production of which by Tree three years later secured the poet's triumph. If *Herod*, 1900, *Ulysses*, 1902, and *Nero*, 1906, glitter with too much tinsel, there was a genuine poetical beauty in the first of his verse plays. Phillips afterwards became over-violent in poetry and drama,



Stephen Phillips, British poet
Elliott & Fry

and fame deserted him before his death, though his episodic war-play, *Armageddon*, had a success soon after the outbreak of the First Great War. In 1905 he reappeared on the stage as the ghost to Martin Harvey's *Hamlet*. He died Dec. 9, 1915. A play by him in blank verse, entitled *Harold*, about the last Saxon king, was discovered in 1921.

Phillips, Sir Tom Spencer Vaughan (1888-1941). British sailor. Born Feb. 19, 1888, he entered the Royal Navy in 1903. He served in the First Great War, passed through the staff college, and became captain in 1927. In 1932 he was appointed chief of staff to the c.-in-c., East Indies, and from 1935 to 1938 was director of plans at the Admiralty. Then he was placed in command of the Home Fleet destroyer flotillas. He became deputy chief of naval staff, 1939, and in 1940 vice-admiral. Appointed c.-in-c., Eastern Fleet, on Dec. 10, 1941, he led a force consisting of the battleship *Prince of Wales* (his flagship) and the battle-cruiser *Repulse*, with escorting destroyers, in an attempt to intercept a Japanese convoy approaching Malaya. After leaving port he was informed that no air cover would be available, but as visibility was low he continued N. When the weather cleared he turned back, but his force had already been sighted, and Japanese bombers sank both major vessels off Khotu Baru. Phillips was thus lost, Dec. 10, 1941, with his ship.

Phillips, Wendell (1811-84). American reformer. Born at Boston, Mass., Nov. 29, 1811, he was educated at Harvard. Called to the bar, he became the most prominent speaker on the abolitionist side, and was president of the Anti-Slavery Society, 1865-70. He advocated state control of the sale of liquor, and reforms in penal administration and labour conditions, and took up the causes of the Indians and the Irish. He died at Boston, Feb. 2, 1884. He was one of America's greatest orators.

Phillipsburg. Town of New Jersey, U.S.A. It stands on the Delaware, in Warren co., 50 m. N.W. of Trenton, with which there is rly. connexion. It was settled in 1749 and incorporated in 1861. Under one foundry is an iron mine, and all kinds of iron and steel products are turned out by the town, which has also rly. repair shops and silk mills. Pop. 18,314.

Phillipotts, Eden (b. 1862). British novelist and playwright. He was born in India, Nov. 4, 1862, and educated at Plymouth. He

worked for ten years in an insurance office before taking up literature as a profession, making his



his first notable success with *Lying Prophets*, 1897, a story of the fishermen of W. Cornwall. Later he

turned to

Devon, producing his "Dartmoor cycle" of twenty volumes, covering the whole area of the moor. *Children of the Mist*, 1899; *Sons of the Morning*, 1900; *The Secret Woman*, 1905; *The Mother*, 1908; *Widcombe Fair*, 1913; and *Children of Men*, 1923, are noteworthy. In lighter vein he wrote *The Human Boy*, 1899, sympathetic and often humorous study of a group of school-boys. He was also the author of many plays, mostly with a Devon background, the most successful being *The Farmer's Wife* (q.v.), 1917, which ran for 1,329 performances in London, and *Yellow Sands*, 1926, written in collaboration with his daughter Adelaide. During 1932-33 his trilogy of novels, *Bred in the Bone*, *Witches' Cauldron*, and *A Shadow Passes*, later collected in one vol., *The Book of Avis*, created fresh interest in his work.

Phillipotts was sometimes called the "Hardy of Devon," although he asserted that he had not read Hardy's novels when his own Dartmoor stories were planned. His tragic novels, moving with relentless logic towards a predestined end, have at their best, however, something in common with the work of Hardy, and present a curious contrast with the almost farcical comedies on which Phillipotts's stage reputation rests.

Philoctetes. In Greek legend, one of the heroes of the Trojan War. In his youth he was a friend of Hercules, from whom he received the arrows poisoned in the blood of the Lernaean Hydra. On the way to Troy Philoctetes received a wound in the foot, and was left behind on the island of Lemnos, where he remained till the tenth year of the war. Then, when an oracle had declared that the active help of Philoctetes was necessary in order to overthrow the city, Diomedes and Odysseus came to fetch him, and with difficulty persuaded him to accompany them to Troy. Philoctetes was made

the theme of tragedies by Aeschylus and Euripides, of which only fragments remain, and of two by Sophocles. *Prom. Filloc-teetez.*

Philo Judaeus. Jewish philosopher and theologian. Born at Alexandria about 20 A.D., he studied all branches of Greek literature and Hebrew learning. The Jews of Alexandria, who had refused to worship the emperor Caligula, sent him as their advocate to Rome, in A.D. 40, and he wrote an account of his mission. Philo's theology, the influence of which has been far-reaching, teaches that the transcendent and unconditioned Deity manifests Himself in creative activity through manifold "powers" subordinated to the personal Logos (q.v.). Philo thus forms a link between the Platonic and Stoic doctrines, the Wisdom literature, and the theology of the fourth Gospel and S. Paul.

Philology (Gr. *philos*, lover of; *logos*, word, speech). Term with three different meanings. (1) Originally, the study of the written word, of literature, especially that of Greece and Rome. This meaning still holds the field on the Continent, especially in Germany. (2) In English-speaking countries, however, the tendency is to understand by it the study of the words themselves, their origin, meaning, inflexions, and correct usage (syntax), which others regard as accessory indeed, but subordinate. In this sense philology may be described as the science of language, as distinct from (3) comparative philology, which is the science of languages.

Comparative philology is the comparative study of the different sounds and words of languages included in a kindred group. The group specially studied in this connexion is that known as Indo-European, Indo-Germanic, or Aryan, and comparative philology is usually taken to mean the study of the Indo-European family of languages, although it might equally well be applied to any other group, such as the Semitic languages. Its object is to collate and explain varieties in form, and to discover the principles which govern them. With this is also connected the comparative study of the syntax of the languages.

Morphologically (according to the structure of the words) languages are divided into

(a) Isolating, monosyllabic, or radical, distinguished by the absence of grammatical inflexions, the relations of words being shown by the position of the radical or a

difference of tone in pronunciation. To this class belong Chinese, Burmese, and kindred dialects.

(b) Agglutinative (glued together). In these, words are formed by the combination of a root-word with suffixes and prefixes, easily separable from the root-word, which remains intact and uncorrupted. To this class belong the languages of southern India, of the Turks and Hungarians. For example, in Turkish, from *sev-mek* (to love) are formed *sev-il-mek* (to be loved), *sev-me-mek* (not to love), *sev-e-me-mek* (not to be able to love), *sev-dir-mek* (to cause to love), etc.

(c) Inflexional. In these the formative part of the word loses its individual character, and is used merely for expressing grammatical relation. Inflexional languages are further subdivided into synthetic, in which different elements unite to form a compound, and analytic, in which the compound is separated into its constituent elements. Greek and Latin are synthetic; English, Persian, and many of the languages of modern Europe, analytic. The place of the inflexions of a synthetic language is taken by pronouns, prepositions, and auxiliary verbs. It is to the inflexional class of languages that the Indo-European family belongs. It is divided into nine groups.

(1) Indian, the most valuable member of which is Sanskrit. The *Rig-Vedas*, a collection of hymns from the sacred literature of the Hindus, are no doubt of greater antiquity than any other Indo-European literature. Bengali, Hindi, Gypsy, and Prakrit and Pali, belong to this group.

(2) Iranian (Persian), including Zend (Old Bactrian), the language of the Zend-Avesta, the sacred books of the fire-worshipping Zoroastrians, found also in the cuneiform inscriptions celebrating the exploits of the Persian kings Darius and Xerxes. The literature of modern Persia begins A.D. 1000.

(3) Armenian, supposed to be of Phrygian origin.

(4) Greek, with its various dialects (Attic, Aeolic, Doric, Ionic), and modern Greek or Romaic.

(5) Albanian.

(6) Italic, including Latin, Oscan, Umbrian, and the cognate dialects of ancient Italy. Vulgar Latin was the origin of the Romance languages: French, Italian, Spanish, Portuguese, Rumanian or Rhaeto-Romanic (spoken in East Switzerland), Rumanian, and Provençal.

(7) Celtic, including Cymric, still spoken in Wales and Brittany

(Breton, Armorican), and extinct in Cornwall; Gadhælic (Goidelic), of which the three forms are Irish, Manx in the Isle of Man, and Gaelic in the highlands of Scotland.

(8) Teutonic, to which group English belongs. It includes (a) Gothic, spoken in the Roman province of Dacia, preserved in fragments containing the greater part of a translation of the New Testament by Ulphilas (*q.v.*), the oldest record of a Teutonic language; (b) Western Germanic, subdivided into Old High German, the ancestor of modern German; Old Low German, represented in modern times by Low Saxon, spoken in a considerable area of northern Germany; Anglo-Frisian, from which modern Frisian, spoken in the N.E. of the Netherlands and in Slesvig, and English, are descended; Old or Low Franconian, the origin of Dutch and Flemish; (c) Eastern Germanic or Scandinavian, including Danish, Swedish, Norwegian, and Icelandic, the earliest remains of which are the Runic inscriptions.

(9) Letto-Slavonic. (a) Lettic (Baltic), including the extinct Old Prussian, and Lithuanian; (b) Slavonic, comprising Czech (Bohemian), Polish, Russian, Serbo-Croatian, modern Bulgarian, and Slovenian. Of these Old Bulgarian or Ecclesiastical Slavonic, the language of the earliest Christian writings of the Slavs, is the most interesting.

The Finno-Ugrian Group

Only very remotely related, if at all, to the Indo-European group are the Finno-Ugrian languages, spoken in Central Europe from Finland to Hungary. The main member-tongues are Finnish, Lapp, Estonian, Mordvin (spoken about the lower Volga), and Hungarian; dialects of these, having each from 3,000 to 300,000 speakers, number about a dozen. The Finno-Ugrian group is remotely related to Tartar and Mongolian, but this connexion has been greatly obscured by free borrowings from its Germanic, Slavonic, and Persian neighbours.

The relationship of the different languages belonging to the Indo-European group is proved by the identity of some of the commonest words denoting action, existence, and similar notions. Take the present tense of the verb to be: Sanskrit, *asmi, asi, asti, smas, stha, santi*; Latin, *sum, es, est, sumus, estis, sunt*; French, *suis, es, est, sommes, êtes, sont*; brother in Sanskrit is *bhrātā*, Greek *phrater*, Lat. *frater*, Celtic *brathair*, Russian *brat*, German *bruder*, English *brother*.

The first three numerals are: Sanskrit, *ekas (eka-), dvau (dua-), trayas (tri-)*; Gr. *heis, duo, treis*; Lat. *unus, duo, tres*; Celtic *un, dau, tri*; Russian *adeen, dva, tri*; German *ein, zwei, drei*; English *one, two, three*. So many similarities of this kind are found that it is certain that an older language, the parent of all Indo-European languages, once existed. It is possible to a certain extent to reconstruct it.

Indo-European Civilization

A number of words pointing to a certain degree of civilization were also the common property of the Indo-European languages. These show that the parent family was acquainted with the use of domestic animals such as the horse and cow, and tended sheep and herds; they lived in houses or huts with doors, not in caves; used rowing boats, made garments of wool and sheepskin, prepared food at the fire, and knew something of the earliest metals. They reckoned by months, and counted up to a hundred.

The question of their original home has not been satisfactorily answered. Older authorities placed them in Central Asia, but modern philologists favour a locality farther west—the borders of Europe and Asia, or even Europe itself, to the N. of the Carpathians.

A comparison of the older with the more recent forms of the languages belonging to the Indo-European family, for instance, modern English with that of Alfred's day, shows that great alterations have taken place in the form and meaning of words, and such changes are still going on. The comparative philologist examines these changes and, where possible, accounts for them.

Comparative philology was first rendered possible by Sir William Jones (1746–94), who introduced ancient Sanskrit to European scholars. Franz Bopp was his equal in Germany. F. A. Pott (1802–87) was the first to investigate scientifically the whole Indo-European group of languages from the standpoint of etymology. The names of A. Schleicher (1821–68), G. Curtius (1820–85), and W. Corssen (1820–75), were the most distinguished representatives of what is called, somewhat arbitrarily, the old school of Philologists. F. Max Müller (1823–1900) popularised the results of philological study for the ordinary student. Some of his theories did not meet with general acceptance, and his views on the nature of language

and its changes are at variance with those of W. D. Whitney (1827–94), whose work on the Life and Growth of Language gave a new impulse to the study.

ROOTS AND INFLECTIONS. The simplest form of a word is the root, that part of a word which remains after it has been stripped of everything formative and accidental. The next stage is the base or stem, in which the root is prepared to receive the inflexional suffixes. Thus, *da-*, *i-* are roots representing the general ideas of giving, going; *da-tar*, giver, with the addition of *-tar* denoting the agent, is a base. To indicate some special relation of one person or thing and another, an inflexional suffix is added: *da-tar-as*, of the giver. This form of a word is called a case (Lat. *casus*, falling, variation). The number of cases in the parent language was seven: nominative, accusative, genitive, dative, locative, ablative, instrumental. The vocative is merely a stem-form. In addition to two numbers, singular and plural, there was a dual, rarely used. The distinction of gender in nouns seems to have been artificial. In the verb, there were originally two voices, active and middle, the latter fulfilling the function of the passive. There were four tenses: present, future, perfect (imperfect), and aorist, the last three of which might be included in the general term past; and four moods, indicative, imperative, subjunctive, and optative. These inflexional variations can be best studied in highly inflexional languages, such as Greek and Latin, whereas in analytical languages, such as English, they have left hardly any traces.

A younger branch of philology, has received the name Semantics (*q.v.*). See also Grammar; Language; Nominative, Genitive, etc. Consult An Introduction to Comparative Philology, J. M. Edmonds, 1906; Language, O. Jespersen, 1922; The Loom of Language, F. Bodmer, 1944.

Philomēla (Gr., lover of song). In Greek mythology, daughter of Pandion, king of Athens. Dishonoured by Tereus, a Thracian prince who had married her sister Procne, Philomēla, together with her sister, took revenge by serving up to Tereus the flesh of his own son Itys. Procne and Philomēla, pursued by Tereus with an axe, in response to their prayers were transformed into a nightingale and a swallow, while Tereus became a hoopoe. According to another version, Philomēla becomes

the nightingale, and in poetry her name in English, Philomel, is a synonym for that bird. *Pron.* Fillo-meela.

Philopoemen (c. 252–183 B.C.). Greek general and patriot, known as “the last of the Greeks.” Born at Megalopolis, he devoted himself as a young man to military studies, and fought with distinction at the battle of Sellasia, 222. In 208 he was elected general of the Achaean League (*q.v.*), when his technical military reforms bore

excellent fruit, in the form of a defeat of the Spartans, near Mantinea. Recognizing the power of the Romans, he avoided conflicts with them. He took Sparta in 188, and abolished the institutions of Lycurgus. During a Messenian revolt he was captured and compelled to take poison.

Philosopher's Stone. One of the chief objects of search in alchemy (*q.v.*). It was a supposed substance that had the power of turning base metals into gold.

PHILOSOPHY: THE SEARCH FOR WISDOM

Lord Lindsay of Birker, Master of Balliol College, Oxford, 1924–49

This work contains articles on the various systems of philosophy, e.g. Epicureanism; Pragmatism; Scepticism; Stoicism. See biographies of great philosophers, e.g. Aristotle, Descartes, Green, T. H., Hegel, Kant, Plato, Socrates; also Ethics; Metaphysics

Philosophy is a Greek word, invented by Socrates in the 5th century B.C. to express the distinctive attitude which he took up to knowledge. His scientific contemporaries and predecessors had called themselves Sophoi—wise men; he called himself a philosopher—one fond of or seeking wisdom—to show that, while he believed in wisdom or science, he did not think he or anyone else had attained it. The philosopher is someone who is seeking wisdom, and has begun by a consciousness of his own ignorance—and philosophy is the name for the inquiries he makes, or for his thinking.

In the original meaning of the word, then, there was little distinction between philosophy and science, except that the suggestion of seeking conveyed by the word philosophy made men give the name science to those inquiries where knowledge was attained and certain, philosophy to those where the search for knowledge was more obvious than its results. In this sense of the word philosophy, the sphere of philosophy contracts as that of science widens. This is to some extent borne out by history. We find the Greeks, or even a man like Descartes in the 17th century, including under philosophy what we should now certainly call science. This suggests that in time, as the methods of science are applied to every sphere of human inquiry, there will be no sphere left for philosophy.

But the real implications of Socrates's new word were rather different. When he said that he was ignorant, he did not mean that he was ignorant of certain things which the mathematician knew, but that the mathematician did not know as much as he thought

he knew; that the so-called knowledge of his contemporaries was not really knowledge. Philosophy, therefore, with him and his successors, involved a criticism of existing knowledge, an attempt to say what it all comes to. In a famous passage in the Republic, Plato contrasts the methods of the scientist and of the philosopher by saying that the scientist starts with certain assumptions which he takes for granted and does not examine, while the business of the philosopher is to criticise the assumptions of the separate sciences and from such criticism to come to an understanding of the whole.

This suggests two characteristics of philosophy. In the first place its method is reflective. It takes as its data not the data of the sciences, but the sciences themselves. In the second place it is concerned with things as a whole; the sciences are departmental.

The Philosopher's Task

The impulse to philosophy arises from the apparent contradictions of different spheres of human inquiry. Thus in Greece in the 5th century B.C. the growth of science seemed to threaten the moral basis of the Greek city state—science and morality seemed in conflict—and the great Greek philosophers were men who cared for both science and morality. Their task was to show that if the real nature of each was understood, and what each implied, the contradiction vanished. It came only from one or the other inquiry overstepping its proper bounds. So again in the 17th century the new applied mathematical sciences, with their assumptions of a world infinite in time and space, rigorously determined and mechanical, seemed to destroy the foundations both of

religion and of the moral life. The work of the philosophic movement of the 17th and 18th centuries, which began with Descartes and culminated in Kant, was to resolve this apparent contradiction. It did so by seeking first to determine the real nature of science and of religion and morality, and by so doing to determine their bounds.

The general lines of the solution are always the same. Contradictions arise only because men engaged in these different inquiries have not properly understood what they have been doing. They have not made clear to themselves the principles on which their inquiries are based, and so have gone outside their proper task. Religion has talked science, talked it on religious lines and therefore badly, and given its bad science an authority it did not deserve. Science has talked religion, on scientific methods and therefore badly, and given to its bad religion an authority it did not deserve. We can understand what we are doing in these different spheres of life only by reflecting on the principles or assumptions on which our different activities are based. This is the task of philosophy. Thus the business of moral philosophy is not to say what is right or wrong—that is done in moral judgements—but to understand what morality is; as the business of the philosophy of art is not to say what is beautiful or ugly, but to understand what we are doing when we call things beautiful or ugly, and what the relation of that activity is to morality or to science. Philosophy, therefore, is always concerned with the principles or assumptions which lie behind different branches of human activity. It is not concerned with the details of those activities, except in so far as they illustrate the principles.

This concern with first principles is what gives philosophy what is called its *a priori* character. This does not mean, as is sometimes supposed, that philosophy has no relation to facts, and is spun out of the philosopher's inner consciousness. All great philosophies have started with the consideration of special problems presented by the sciences of their day, and have been built on knowledge of and reflection upon those sciences. It has, however, sometimes been thought that it is possible by a study of the first principles implied in science and other human activities to build up a knowledge of the real nature of the universe,

which goes beyond and may have very little to do with our actual knowledge of different facts.

Idealism, as sometimes understood, and materialism, are philosophies which profess to show, by rigorous reasoning, that the only reality is mind or matter. It was the great achievement of Kant to show in his *Critique of Pure Reason*, 1781, that in such a dogmatism, as he called it, philosophy was overstepping the limits of its function, and using conceptions, which were only applicable to what we experience, outside the bounds of experience. Philosophy, he held, should be confined to criticism, to the understanding of the relation of the sciences and other forms of human activity to one another.

Nevertheless, just because philosophy is reflective in the sense described, it is always concerned to see things as a whole, to overcome the departmentalism of the different branches of human activity, and to attempt to say what they all come to.

Its assumption in this task is that the world we live in is an intelligible one. It can also sketch what would be an intelligible universe; what must be the relation of the various things we know, and all that is beyond our knowledge if the whole is to be thought of as intelligible. This is the constructive side of philosophy. No one can read a great constructive philosopher like Plato or Spinoza or Hegel without feeling

that he has, somehow, in the process come to understand more of the meaning of life and of the nature of the world we live in.

It is a mistake, however, to suppose that such constructive philosophy, such a world vision, as the Germans call it, has either the precision of the exact sciences or the rigour of logical criticism. The great philosophies bear upon them the stamp of the personality of their authors. They seem to stand between science and poetry. Their illumination and truth are of the order of poetic rather than of scientific truth. A philosophy has a value all its own, because of its comprehensiveness, because it is the wisdom of a mind which has tried to think through and comprehend the great mass of human knowledge. Such philosophies can never be final. For, as the sum of human knowledge increases, as science lays open new fields to man's understanding, the comprehensive and synthesising work of philosophy has to be done afresh.

Bibliography. Outlines of the History of Greek Philosophy, E. Zeller, Eng. trans. F. S. Alleyne and E. Abbott, 1901; *The Republic*, Plato, Eng. trans. A. D. Lindsay, 1908; *Brief History of Modern Philosophy*, H. Höffding, Eng. trans. C. F. Sanders, 1912; *The Problems of Philosophy*, B. Russell, 1912; *History of P.*, C. C. J. Webb, 1915; *Guide to Philosophy*, C. E. M. Joad, 1936; *Guide to the Philosophy of Morals and Politics*, C. E. M. Joad, 1938; *History of Western Philosophy*, Russell, 1946.

MODERN PHILOSOPHY

C. E. M. Joad, M.A., D.Litt

This article explains how 20th century developments, in society itself, in concepts of human motive, and in the attitude to reason, have affected the philosopher's approach to his subject

Modern, that is to say 20th century, philosophy is in a state of confusion. "Philosophy," says Lord Lindsay in the preceding article, is "concerned with things as a whole." He is right; but there is, broadly speaking, no contemporary philosophical view of "things as a whole."

In most of the ages of recorded history and as recently as the 19th century people thought they knew what the world was like and what it was for. The world was a creation by God and it was for the moral training and development of man. That was the religious view. Or, alternatively, it was a collection of material, particles, moving about in space, and it was for nothing at all. That was the scientific view. But neither the religious nor the scientific view is

held with the old certainty. We also live in an age of political disintegration and revolution; and philosophy reflects the conditions of the age in which philosophers live and must try to think.

Lord Lindsay speaks of "constructive philosophy" and its "world vision." In the 20th century, broadly speaking, these no longer exist. Instead, philosophers address themselves to particular problems, tackle them piecemeal, and instead of seeking, as they have done in the past, to deduce by reasoning what must be the nature of the universe as a whole, are content if they can put forward considerations which may be true in regard to separate problems such as the nature of "perception," or the meaning, if any, to be attributed to the term "the

unconscious self." Or they endeavour to suggest fruitful hypotheses for science to explore. In this way philosophy has approximated more closely to science, both in its methods and in its conclusions, than in the past.

There are two main reasons for this narrowing of scope and limitation of aim. First, there is a scepticism in regard to the instrument of knowledge, reason. It is, after all, by means of reason that, men have believed, information about the universe was to be obtained; it is certainly by means of reason that philosophy has been pursued. A number of factors have combined to throw doubt on this traditional view:

(1) Pragmatism (*q.v.*), which has suggested that reason functions only to serve our purposes, and that the so-called truths at which it arrives are, in fact, only those which it suits us to believe.

(2) The influence of the French philosopher, Henri Bergson, whose thought flourished more particularly in the years immediately before 1914. Bergson, in fact, made philosophy fashionable. In a number of works, of which *Creative Evolution* is the best known, he sought to show that the universe is not as it appears, a collection of comparatively solid, static objects occupying space, but is a continuous flow or flux exemplified for us by the stream of our own consciousness. It is by the faculty which Bergson called "intuition" that the true nature of reality as a continuous flow is realized.

(3) The influence of psychology in general and of psycho-analysis in particular, which has thrown doubt upon reason by disclosing the influence upon it of the non-rational factors in our make-up. Reason is thus represented as a handmaid of desire, its function being to invent arguments for what we instinctively want to believe.

A second factor which has led to the abandonment of traditional philosophical claims and methods is logical positivism. This, which originated in the work of Bertrand Russell, is concerned to inquire into the nature and meaning of language, in order to determine whether, when we use such words as "reality," "truth," "justice," "ultimate," "universal," we are really saying anything at all about the nature of the world. If, as the logical positivists assert, we usually are not, the question arises whether the traditional language of philo-

sophy can ever give us information about the universe which exists independently of ourselves.

Logical positivism is, perhaps, the most important 'single movement in contemporary philosophy. Nevertheless, its effect is almost purely destructive. If its contentions are correct, no constructive theory of the nature of the universe can be offered by philosophy or by anything else.

Of the philosophies which follow more traditional methods, two only can be mentioned here. The first, that of Samuel Alexander, is the most complete philosophical expression of the doctrine of evolution, in that it regards the whole universe as evolving, and producing ever higher levels of being in the process of its own development. Of these the highest, God, is regarded as being Himself a product of the evolving universe and sharing, therefore, in the process of its development. The second system, that of A. N. Whitehead, takes its rise from a criticism not only of the traditional scientific view of the universe but also of scientific method, regarded as the sole and exclusive method for the discovery of truth. Science, Whitehead has insisted, must be supplemented by the data provided by art, personal relations, and religion. The view of the universe which results is modelled on the conception of a living organism.

Bibliography. Creative Evolution, Bergson, 1907; Space, Time and Deity, S. Alexander, 1920; Science and the Modern World, A. N. Whitehead, 1925; Process and Reality, A. N. Whitehead, 1928; The Mind and its place in Nature, C. D. Broad, 1925; Philosophy for our Times, C. E. M. Joad, 1940.

Philostratus (c. A.D. 170–250). Greek sophist. Born in Lemnos, he studied and taught at Athens, and later took up his abode in Rome. At the instigation of his patroness, Julia Domna, wife of the emperor Septimius Severus, he wrote a romantic Life of Apollonius of Tyana, Lives of the Sophists, and a treatise on Gymnastics. Another Philostratus wrote on Paintings.

Phipps, SIR ERIC CLARE EDMUND (1875–1945). British diplomatist. Son of an ambassador, he was born Oct. 27, 1875, and educated in Paris and at King's College, Cambridge. He entered the diplomatic service in 1899, and, after minor appointments, became counsellor of embassy at Paris, 1919, and the following year at Brussels. In 1922 he went to Paris as minister, in 1928 becoming minister in Vienna. His appoint-

ment as ambassador in Berlin coincided with the rise of Hitler, and his reports formed the basis of a white paper which was presented to parliament explaining the German situation. In 1937 he succeeded Sir George Clerk as ambassador in Paris, remaining there until his retirement in 1939. He was knighted in 1927, and he died Aug. 13, 1945.

Phiz. Pseudonym taken by the Dickens illustrator, H. K. Browne (q.v.) to accord with Dickens's pseudonym, Boz.

Phlebitis (Gr. *phleps*, vein). Inflammation of a vein. This condition rarely occurs in a healthy vessel but rather in one that is varicose or has its walls diseased following high blood pressure, conditions like rheumatism, or the infective fevers. The part around the inflamed vein becomes red and hot; there is swelling, and tenderness to touch. A clot commonly forms, and the vein now stands out as a hard raised line. Treatment consists in absolute rest of the part for some six weeks. The risk is that part of the clot will break off and be carried away, either taking the infection with it or possibly causing death by striking a vital organ. Cure occurs after the acute inflammation has subsided by the blocking of the affected vein, the blood finding its way by other routes; or by the blood-stream channelling a path through the clot.

Phlebotomy. Technical term for the process of cupping (q.v.).

Phlegethon (Gr., flaming). In Greek mythology, a river of fire in the lower world.

Phloëm (Gr. *phloios*, inner bark). Botanical term, denoting the bast or soft cellular tissue on the exterior of the vascular bundles found in stems, leaves, and roots of plants. Its cells form the channel through which the sugar and proteins elaborated in the leaves are transmitted to those parts of the plant where they are required for building up and for reserves.

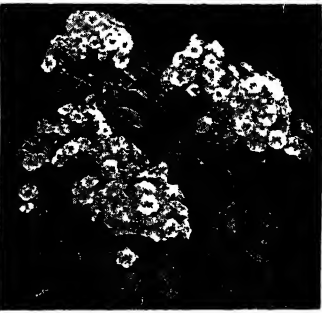
Phlogiston (Gr. *phlogistos*, burnt). Term formerly used in chemistry for a supposed substance contained in all inflammable materials. The phlogiston theory was widely held by leading chemists in the 18th century, it being believed that the more phlogiston present in a substance, the more violently it burnt. The theory was exploded by the researches of Lavoisier and Priestley.

Phlogopite (Gr. *phlox*, flame; *ops*, face). In mineralogy, a magnesium mica. It is a light yellow

to brown and red, and when looked at through a thin sheet it shows star-shaped reflections. It is found in association with ultrabasic igneous rocks and altered limestones. It has value as an insulator in electrical equipment.

Phlomis. Large genus of shrubs and herbs of the family Labiatae. They are natives of the temperate and mountainous parts of Asia and the borders of the Mediterranean. They have yellow, purplish, or white flowers in whorls around the upper parts of the stems. The wrinkled leaves are in many cases cottony or woolly beneath. Some species are very showy.

Phlox (Gr., flame). Genus of about 50 species of herbs, mostly perennials, of the family Pole-



Phlox. Foliage and flower clusters

moniaceae, natives of N. America (chiefly) and Siberia. They have undivided leaves, and showy salver-shaped flowers of some tint of red, violet, or white, borne singly or in panicles. Many have become favourite garden flowers in Great Britain, to which the smooth-leaved *P. glaberrima* was introduced in 1725 from what is now the southern U.S.A. From this and from *P. paniculata* and *P. maculata*, introduced a few years later, most of our garden hybrids have descended. These are perennials, propagated by cuttings and root-divisions; the natural species may also be increased by seed sown as soon as ripe. There are several dwarf perennials, whilst the favourite half-hardy annual is *P. Drummondii*. Phloxes do well in any well-drained garden soil.

Phocaea. Ancient Greek city of Asia Minor. Situated on a promontory N. of the Gulf of Smyrna (Izmir), it became a great maritime and colonising power; the Greek colony of Massilia (Marseilles) was an offshoot from Phocaea. When, with other Greek cities of Asia Minor, Phocaea passed under the dominion of Persia, about the

middle of the 6th century B.C., the majority of the inhabitants emigrated to Corsica and elsewhere.

Phocion (402-317 B.C.). Athenian general and statesman. A competent soldier, he distinguished



Phocion,
Athenian general
From a statue in the
Vatican, Rome

himself at the battle of Naxos in 376, at Tamynae in 354, and by raising the siege of Byzantium in 339. A sincere patriot, noted for his single-minded integrity, he nevertheless belonged to the pro-Macedonian party at Athens, believing that resistance to Philip and later to Alexander and Antipater was useless, and that he was doing a real service to his country by impressing this idea on the Athenians. In 318 Phocion was accused of assisting the son of Polyperchon to occupy the Piraeus, and was condemned to death the next year.

Phocis. Country of ancient Greece. It lay N. of the Corinthian Gulf and W. of Boeotia. It contained the famous Mt. Parnassus (*q.v.*), sacred to Apollo and the Muses, and the equally famous Delphic Oracle (*see* Delphi). The population was chiefly Aeolic, mostly occupied in pastoral pursuits. There were no large towns. The Phocians were not conspicuous in Greek history until the 4th century B.C., when, owing to their failure to assist them at the battle of Mantinea in 362, the Thebans instigated the Amphictyonic Council (*q.v.*) to declare their land forfeited to the Delphian Apollo. The Phocians, led by an able citizen, Philomelus, retorted by seizing the treasure at Delphi and, using it to hire mercenaries, defied Thebes and the Amphictyons for ten years, and only yielded in 346 when Philip of Macedon came to the help of the Amphictyons. The war is known as the Sacred War. *See* Greece.

Phoebē (Gr., bright). In Greek mythology, name given to Artemis as moon goddess, the female counterpart of Phoebus. *See* Artemis.

Phoebus. In Greek mythology, name given to Apollo as sun god. *See* Apollo.

PHOENICIA: ITS CULTURE & COMMERCE

A. D. Innes, M.A., and E. G. Harmer

Related articles that may be consulted are those on Carthage; Jews; Mediterranean; Palestine; Syria; Tyre; Sidon. See also Alphabet

Phoenicia was the small territory on the E. coast of the Mediterranean lying immediately N. of Palestine, between the range of Mount Lebanon and the sea. Its length from Akko (the modern Acre) northwards does not exceed two hundred miles; its breadth averages perhaps fifteen miles. As a military power Phoenicia played no important part in the world's history; but she planted colonies, one of which, Carthage, achieved for a time an imperial position; the skill of the Phoenician seamen gave their fleets a high value in maritime warfare; and their supremacy in regard to seaborne commerce was maintained, in spite of the development of Greek rivalry, until Phoenicia lost her separate existence at the end of the fourth century, and her offspring Carthage was crushed by Rome a hundred years later.

Language and Religion

It is generally agreed that the Phoenicians belonged to the great race group known as the Semites. Their language at least was Semitic, closely related to Hebrew. Their religion was based upon the worship of the male and female principles, commonly associated with the names Baal and Ashtaroth, or Astartē; though in course of time the two were multiplied by a process resembling that by which in medieval times popular superstition tended to make many saints out of one who had several famous shrines. Of Baal and the Baalim we hear much in the Hebrew records; and we know that the worship of Melek, the Moloch of the O.T., was accompanied by human sacrifice, and more particularly by the burning of infant victims; while the worship of Ashtaroth carried with it the repulsive practice of religious prostitution.

The destinies of Phoenicia were determined by her geographical position. The Semitic wave which bears the general name of Canaanite occupied Palestine and the regions to the N. of it a century or two before 2000 B.C. Between 1600 and 1200 the S. portion was conquered by fresh Semitic tribes from the S., the Hebrews, and by the Philistines, maritime invaders from across the sea. But the N. Canaanites, the Phoenicians, were able to hold their own against both the invaders, since they were open to attack only by sea or by the two narrow entries in the N. and on the S.—the mountains of Lebanon

providing them with an effective barrier along the whole rear. This security upon the landward side encouraged maritime development; so that the Phoenicians were already able to resist the attack of the Philistine pirates, and learnt the advantage of devoting themselves to commerce in the centuries when other nations and other races were still engaged in a perpetual struggle to win a foothold in new territories, or to hold these territories against invaders.

The fame of the Phoenicians is due to their supremacy as navigators over all rivals. In the 5th century the pre-eminence for a thousand years which they had inherited was still undisputed. They alone of seafaring men had passed out of the Mediterranean, coasted along Spain and France, established a trade with the "Tin islands"—the Scilly Isles and Cornwall—and penetrated possibly as far as the Baltic, from which they procured amber. Moreover, Phoenician ships in the Egyptian service actually accomplished the circumnavigation of Africa about the year 610 B.C., though the voyage was not repeated. They are the single people in the ancient world who lived for commerce; they sought no territorial dominion; if they planted out colonies, the primary intention at least was merely the establishment of trading stations like those of the English in India during the 17th century; Carthage alone, long after its foundation, sought to develop upon imperial lines, and to establish a political ascendancy where she secured a commercial footing. First of men, the Phoenicians learnt that seafighting is primarily a matter of seamanship, and, being skilled seamen, could defy attacks by sea.

Commercial Importance

Like the maritime Italian cities of the Middle Ages, the Phoenician ports became the commercial emporiums of the ancient world, and they waxed wealthy; but the Phoenicians are not to be credited with any remarkable manufacturing inventions. It was the exploitation of ancient purple dyes, not their discovery, for which they became famous. In the making of glass, wherein they excelled, they only turned to better account processes already invented by the Egyptians, and their reputation as clothmakers was attained by improved methods rather than by original discoveries. Phoenicia



1. Restoration of tomb at Amrith, shown also in 2 in its ruined state. 3. Carved ivory comb. 4. Bowl in repoussé work, from Fraeneste. 5 and 6. Sarcophagi from Sidon. 7. Bronze mirror handle. 8. Pottery vase with typical Phoenician ornament, from Dali, Cyprus. 9. Examples of glass-work. 10. Bead necklaces

PHOENICIA: ARTISTIC HANDIWORK OF THE ANCIENT SEMITIC KINGDOM

With the exception of 8, by courtesy of Chapman & Hall, Ltd

made no original contribution to art; but it was in strict accord with the Phoenician genius that it should have made the great advance upon early systems of script or writing which rendered the Phoenician alphabet the basis of those which ultimately prevailed in the Western world.

Phoenicia never formed a united nation with a common government. It was a group of city-states, of which the most important were Arvad (Aradus), on the N., Gebal (called by the Greeks Byblos and by the Egyptians Kapun), Beirut, Sidon, and Tyre on the S. Early in the 15th century B.C. the conqueror Thothmes III brought them under the Egyptian supremacy (*see* Egypt), and they became tributaries, though otherwise remaining autonomous. At this time Byblos apparently held the leading position. By the 13th century the yoke of Egypt had slipped off. Phoenicia was again independent, and it is this period which marks the beginning of its maritime and commercial ascendancy. Politically, however, Tyre seems soon to have predominated, the result, perhaps, of its extraordinary strength as a fortress; but Sidon probably enjoyed a prestige of its own as the religious centre. In the Homeric poems, not Tyrian but Sidonian stands as the general equivalent for Phoenician. During the 12th century Tyre and Sidon were planting out colonies along the coast of Africa at Utica and elsewhere, and even beyond the straits of Gibraltar in Spain, at Gades and Tartessus, which is usually identified with the Tarshish mentioned by Jeremiah (c. 600 B.C.).

Relations with the Hebrews

In the 11th century the Hebrew records show that Tyre had definitely become the leading Phoenician state. Hiram, king of Tyre, was the ally of David and Solomon during the brief period of Hebrew consolidation and expansion, which broke down with the disruption that followed the death of Solomon. The relations between Phoenicia and the Hebrew kingdoms were maintained, and Ahab, king of Israel, married Jezebel, daughter of Ethbaal, or Ithobal, king of Tyre and Sidon, in the earlier half of the 9th century. It was about this time, however, that the power of Assyria was extending, and Phoenicia before 840 had become tributary to Shalmaneser III.

After 730 Tyre revolted, and successfully defied the power of Shalmaneser V. Phoenicia was again subjugated by Sennacherib,

about 700, and though she again achieved a brief freedom when Assyria was shattered towards the end of the 7th century by the rise of the new Babylonian empire, she soon found herself forced to submit to Nebuchadrezzar, though Tyre, on its island fortress, held out against his attack for 13 years. Phoenicia yielded a ready submission to Cambyzes in 527.

Then for two hundred years Phoenicia formed an autonomous province within one of the great satrapies of the Persian empire, providing the Persian kings with the most efficient contingents of their fleets. In 351, however, Phoenicia revolted. Overwhelming armies were poured into the province; resistance was hopeless; but the people of Sidon rather than submit chose to make a literal holocaust of the city when 40,000 of the inhabitants are said to have perished in the flames (345). Eleven years later, when Alexander the Great invaded Persia, his movements were greatly hampered by the fact that his enemy had command of the sea, because the Phoenician fleet still served the Great King, though its loyalty cannot have been deeply rooted. But after Alexander had put Darius to rout at the Issus (333), the cities of Phoenicia, with the exception of Tyre, broke from the Persian allegiance and submitted to the Macedonian.

Siege of Tyre

Then ensued one of the most memorable sieges in classical history. Tyre, on its island, had defied Nebuchadrezzar for 13 years; now it defied Alexander. It was only by means of engineering operations without precedent or parallel that the great master of war was at last enabled to storm the fortress after an heroic defence; nor would that success have been within his reach but for the accession of the Phoenician fleet, with the exception of the Tyrian navy itself. With the fall of Tyre in July, 332, the separate history of Phoenicia comes to an end. The history of Greater Phoenicia, the independent Phoenician colonies, was to all intents and purposes the history of Carthage.

ARCHAEOLOGY. Material remains of the Phoenician civilization have been sparingly recovered in the homeland. Marked by an imitative rather than a creative spirit, the earlier examples form an imperfect amalgam of Egyptian and Mesopotamian motives, the later an unskilful adaptation of Hellenistic art.

Along the coast are many rock-cut tombs, sometimes with remains of monolithic and other external structures. Some have yielded sarcophagi shaped like swathed mummies. The finest, that of Eshmunazar, in Paris, and that of his father Tabnith, in Istanbul, were both Egyptian importations; the local work is inferior. The primitive temple at Amrith, the only one extant in Phoenicia, copied the Egyptian style. The preference for megalithic masses is shown by the Arvad city walls and the Thapsus harbour works. In 1920 the fortifications surrounding the Sicilian island of Motya were reported traced.

No specimens of Phoenician weaving or dyeing have been identified. The importance of the purple industry is attested by immense shell-mounds near Sidon and Tyre; how far their textile trade was served by native looms is unknown. Glasswork is represented by small ointment flasks tinted with metallic oxides, and by opaque glazes—copied from Egyptian falence—which were used for imitation jewelry, amulets, and the like, produced for export. Terracotta figurines of indifferent quality were turned out for the same trade.

Skill in Metal Work

Excellent work was done in engraving and hammering sheet metal. Cups and platters, or paterae, in silver and silver-gilt, with mythical scenes and illustrations of daily life, sometimes bear Phoenician inscriptions, but the best were Cypriote. One such Cyprus bowl, with the name of Hiram, king of Tyre, exhibits the oldest example of Phoenician writing. Bronze paterae unearthed at Nimrud, associated with ivory carvings, sometimes reveal the names of Phoenician artisans, presumably attached to the Assyrian court. Unimaginative mixtures of styles characterise much Phoenician work, as in the form of the sphinx, which was usually recumbent, as in Egypt, but winged, as in Assyria.

Of the many thousands of inscriptions collected, few are of historical value. The earliest has been mentioned; another, from Sinjerli, preceded the fall of Nineveh. All others, including the famous Yehawmelek stela from Byblos, are subsequent to the Persian conquest. Phoenician seacraft is illustrated on Assyrian wall-reliefs and in Egyptian tomb-paintings. Nothing remains to mark the more distant adventures of the Phoenician seamen in their

voyages round Europe and Africa. *Consult* History of Phoenicia, G. Rawlinson, 1889; Ancient History of the Near East, H. R. Hall, 8th ed., C. J. Jadd, 1932.

Phoenix. In Greek legend, king of the Dolopēs. He became tutor of Achilles, accompanying him to the Trojan War. He was one of the heroes who took part in the hunt for the Calydonian boar.

Phoenix. In astronomy, one of the southern constellations. Named by Bayer, 1603, it possesses a number of well-known double stars, Alpha Phoenicis having a period of 190 days. It was shown by Sir David Gill to be moving away from the sun at over 50 m. a second.

Phoenix. Mythical bird of the Egyptians, sacred to the sun god. In the best-known version of the fable, the bird was supposed to appear at Heliopolis once in every 500 years and build a pyre, on which it was burnt, a new phoenix rising from the ashes.

Phoenix. British assurance company. It was founded in 1782, being one of the oldest associations of the kind. Its assets are over £50,000,000, and the head offices at Phoenix House, King William Street, London, E.C. 4.

Phoenix. City of Arizona, U.S.A., capital of the state and co. seat of Maricopa co. A rly.



Phoenix, Arizona. Air view of the state capital

junction, it is 145 m. N.W. of Tucson. Its industries are concerned with dairy products, it exports citrus fruit, and Indians do a lively trade in precious stones. The dry climate attracting many visitors, during the 1930s Phoenix greatly extended its boundaries. Its buildings are among the most modern in the U.S.A. Pop. 65,414.

Phoenix Islands. Group of eight small islands in the Pacific,

about 1,200 m. N.N.E. of Fiji, in lat. 3°-5° S., long. 170°-175° W. They cover about 16 sq. m. and support a pop. of 850. They are ruled as part of the British colony of Gilbert and Ellice Islands, but the U.S.A. has been granted facilities for communications and aviation on Canton and Enderbury Islands.

Phoenix Park. Public park on the W. confines of the city of Dublin. The name is derived from the Irish *fiann uisce*, clear water. It comprises 1,752 acres, with a circuit of 7 m. Within the grounds are Viceroyal Lodge and the former residence of the chief secretary, the zoological gardens, the people's garden, and an obelisk (205 ft. high) in memory of the 1st duke of Wellington. *See* Dublin.

Phoenix Park Murders. Name given to the murders of Lord Frederick Cavendish and T. H. Burke in Phoenix Park, Dublin, May 6, 1882. On that day Earl Spencer, the new lord-lieutenant, entered Dublin in state, and in the evening Lord Frederick, the chief secretary, and Burke, the under-secretary, set out across Phoenix Park for the former's residence. It was still daylight, but on the way they were attacked by four men with knives and killed. In 1883 a builder named James Carey turned informer, and largely on his evidence 20 men belonging to the Irish Invincibles Society were found guilty and five hanged for the murders. Carey was sent for safety to S. Africa, but, although great secrecy was observed, he was murdered on board. *See* Parnell, C. S.

Phoenix Theatre. London playhouse in Charing Cross Road, W.C. 2. It was opened Sept. 24, 1930, under the management of C. B. Cochran, the first production being Noel Coward's *Private Lives*. Other successes included *Late Night Final*, 1931; *To-night at 8.30*, 1936; revivals of Congreve's *Love for Love*, 1943, and Vanbrugh's *The Relapse*, 1948. The theatre seats 1,011.

Pholas. Genus of marine bivalve molluscs. They burrow in soft rocks, wood, and firm mud around the shore, about four species occurring in Great Britain. They have white shells, and the common species, *P. dactylus*, is



Pholas. Section of soft rock showing examples of *Pholas dactylus* in their burrows

locally known as the piddock, and used for both bait and food.

Phon. Unit of the scale of loudness. It uses an arbitrary zero based on an acoustical pressure of 0.0002 dynes per sq. cm., and has a pure reference tone of 1,000 cycle source of sound. It is numerically equal to the decibel, but is reserved for a standard note, whereas the decibel refers to acoustical intensity. *See* Noise.

Phonetic Alphabet. Accepted, though erroneous, name for the system of letter identification used in telephony and radiotelephony to avoid confusion in the spoken pronunciation of the spelling of transmitted words; sometimes called spelling by analogy. In 1943, when much military traffic was carried over British post-office telephone lines, the Royal Corps of Signals introduced the following phonetic alphabet, afterwards adopted as standard in the U.K. by the P.O., defence authorities, and govt. depts.:

A, Able; B, Baker; C, Charlie;

D, Dog; E, Easy; F, Fox; G,

George; H, How; I, Item; J,

Jig; K, King; L, Love; M,

Mike; N, Nan; O, Obote; P,

Peter; Q, Queen; R, Roger; S,

Sugar; T, Tare; U, Uncle; V,

Victor; W, William; X, X-Ray;

Y, Yoke; Z, Zebra.

Phonetics (Gr. *phoneo*, speak).

Name for the science which investigates the acoustic qualities of sounds of languages, the manner in which they are produced by the larynx, tongue, lips, etc., and the modes of placing them in succession to form words and sentences. The pursuit of this science entails proficiency in the skills of (1) hearing accurately the distinctions between minute shades of sound quality and (2) making unfamiliar sounds with precision and uttering combinations of them with fluency.

Speech sounds are of many kinds. Some are made in the larynx; such are breath (air passing

between wide opened vocal cords), voice (vocal cords close together and made to vibrate), and the glottal stop (a sound resembling a slight cough, often prefixed in English to lay emphasis on initial vowels). Others are articulated in the mouth; such are *p*, *t*, *k*.

Vowels are special modifications of voice, produced with the lips apart and the tongue separated from the palate sufficiently not to give rise to audible friction when the air passes out. The number of tongue positions satisfying this condition is infinite. Consequently there exist an immense number of distinguishable vowel sounds. The degree of spreading or rounding of the lips also affects vowel quality.

Classification of Vowels

Vowels are classified according to (1) the part of the tongue which is raised, and (2) the height of the part raised. There are thus (1) front, central, and back vowels, and (2) close and open vowels with intermediate degrees of which the most important are termed half-close and half-open. Each tongue position may be combined with spread, neutral, close rounded, or open rounded lips. The *i* and *u* sounds of German, Spanish, etc., are close vowels; *i* is front and spread, *u* is back and rounded. Sounds of the *e* and *o* types are more open. Sounds of the *a* type are open and have neutral lips. The German sounds of *ü* and *ö* are front rounded vowels. The English sound of *a* in *about* is a central unrounded vowel.

Consonants are formed by complete or partial closures in the throat or mouth. Complete closures give rise to plosive consonants (e.g. *p*, *k*, glottal stop); closure in the mouth combined with lowering of the velum gives nasal consonants (e.g. *m*, *n*); partial closure by the tongue with opening at one or both sides gives lateral consonants (varieties of *l*); a rapid succession of taps gives a rolled consonant (e.g. rolled *r*); narrowing of the passage to such an extent as to produce audible friction when the air passes gives fricative consonants (e.g. *f*, *v*, *s*, and the Scottish sound of *ch* in *loch*). Gliding sounds which begin at a close vowel position and pass rapidly to a more open one are called semi-vowels; they count as consonants (e.g. English *w*).

Consonants may be produced at various points of the air passage. There are labials formed by the two lips (e.g. *p*); labio-dentals

formed by the lower lip against the upper teeth (e.g. *f*); dentals formed by the tongue tip against the upper teeth (e.g. the English sounds of *th*); alveolars formed by the tongue tip against the upper gum or teeth ridge (e.g. English *t*); retroflex consonants formed by the tongue tip retracted so as to touch the middle of the hard palate (e.g. the Swedish sound of *r* or the *ɻ* of Indian languages); palatals formed by raising the front or fore part of the body of the tongue towards the hard palate (e.g. the French sound of *gn*); velars formed by raising the back of the tongue towards the soft palate (e.g. *k*); pharyngeals formed by a contraction of the pharynx (e.g. Arabic *ħ*); glottals formed by action of the vocal cords (e.g. the glottal stop). Other consonants are made in positions intermediate between some of these; for instance the English sound of *sh* is intermediate between alveolar and palatal. Others again are made with articulations in two places simultaneously; for instance the *gb* consonant of the Igbo language of Nigeria has simultaneous labial and velar articulations, the "implosive *ɓ*" of Zulu has simultaneous labial and glottal articulations, and the Zulu click written *c* has simultaneous dental and velar articulations.

Speech into Writing

Phonetics is concerned not only with the manner of forming speech sounds, but also with the manner of using them in languages, with their lengths, with the stresses or force accents of syllables, and with the intonation (voice pitch) in sentences and the pitches of words in tone languages (such as Chinese). It is concerned, too, with the theory of the representation of speech by writing. When the sound system of any particular language is examined, it is always found that some sounds which are actually different have to be regarded for linguistic purposes as if they were one and the same: the differences are conditioned by the phonetic context, e.g. by the neighbouring sounds in the word or by length or by stress. For instance the *k* sounds in *keep*, *cart*, and *cool* are all different (as can be tested by saying them in isolation), but the variations depend upon the vowel following, and in a phonetic transcription they are all written *k*. Similarly the *l* sound in such a French word as *simple* (said by itself) differs considerably from the usual French

l; it is unvoiced and resembles the Welsh sound of *ll*. This unvoicing is accidental and is due to the presence of the preceding *p*. The voiceless *l* is, therefore, in French, a variant of *l* used in a particular context; it does not need to be written otherwise than by the letter *l*. The similar Welsh sound, however, does need special phonetic representation, since its use is not prescribed by any phonetic context.

The Phoneme

When differences between two sounds are traceable solely to phonetic context, the sounds are said to belong to a single phoneme. Voiced and voiceless *l* belong to a single phoneme in French, but to two separate phonemes in Welsh. The simplest type of phonetic transcript of a language is one which provides a single mode of representing each phoneme of the language. Generally it is advisable to use a single letter to designate each phoneme, but sometimes in order to economise symbols a phoneme may be represented by a digraph, or sequence of two letters. The number of phonemes in languages varies from about 20 (as in Japanese) to about 60 (as in Hindustani). In the standard English of S. England there are 40, including the 9 diphthongal sounds. The Roman alphabet is not adequate for writing languages phonetically. When phonetic writing is needed, new special letters often have to be added. The best known augmented Roman alphabet for phonetic purposes is that of the International Phonetic Association, University College, Gower Street, London, W., of which consult the various publications.

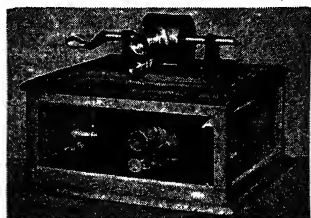
Experimental phonetics has for its object the analysis of speech by means of special apparatus, e.g. by kymographic tracings, cathode ray oscillograms, artificial palates, X-ray photography. Findings by the auditory method may be corroborated or disproved by such experimental means. Gramophones are also useful in certain kinds of linguistic research.

Phonetic science has many useful applications. The best known is its application to the learning of spoken foreign languages. Other applications are in connexion with the teaching of particular types of the mother tongue, the teaching of reading to infants, the curing of certain kinds of individual speech defect such as lisping, the study of the history of languages, and the provision of alphabets for

languages hitherto unwritten or unsuitably written. Experiments with phonetic apparatus have also been made to improve hearing aids for the deaf.

Daniel Jones, D.Phil.
Bibliography. Principles of the International Phonetic Association; Elements of Phonetics, W. Ripman, 1903; Primer of Phonetics, H. Sweet, 1906; General Phonetics, G. Noël-Armfield, 1924; American Pronunciation, J. S. Kenyon, 6th ed. 1935; The Phonetics of French, L. E. Armstrong, 1932; The Phonetics of English, I. C. Ward, 3rd ed. 1939; Outline of English Phonetics, D. Jones, 6th ed. 1939; Fundamentos de Escritura Fonética, D. Jones and I. Dahl, 1944; The Phoneme, its Nature and Use, D. Jones, 1949; The Pronunciation of English, D. Jones, new ed. 1949.

Phonograph (Gr. *phōnē*, sound; *graphein*, to write). Talking machine which records and repro-



Phonograph. A replica of and (in case) the original phonograph invented by Edison in 1877

duces sounds. As invented in 1877, it consisted of an axially-moving rotating brass cylinder, mounted on a screw, and covered with tin foil, against which pressed a needle secured to a thin diaphragm. The needle ran in the middle of a helical groove cut on the cylinders, and, when the diaphragm was not vibrating, the needle forced the tin foil into the groove, whereas, when the diaphragm was vibrated by sound waves entering a trumpet or horn, the movements of the needle made indentations in the tin foil in the groove.

To reproduce the sounds, the needle was drawn away, and the cylinder was rotated backwards until the needle was brought to the point at which it started. The cylinder was then rotated forwards, and the needle allowed to run over the tin foil, the indentations in which caused the needle to vibrate, and the diaphragm to reproduce the original sounds. The metal cylinder was later replaced by wax. The word phonograph is still used for gramophone (*q.v.*) in the U.S.A. See Sound: Amplification and Reproduction.

Phonography. System of rapid writing better known under the name of shorthand (*q.v.*).

Phonolite (Gr. *phōnē*, sound; *lithos*, stone). An igneous rock consisting chiefly of nepheline and sanidine, together with augite, hornblende or biotite. Phonolites have chiefly been formed as lavas, and give out a distinctive clinking sound when struck by a hammer, giving them their alternative name of clink-stones. They decompose easily, owing to weathering into zeolite minerals, and are found in France, Germany, Italy, Cape Verde Islands, Wolf Rock, etc. See Zeolite.

Phoronidea. In zoology, a group of invertebrate, coelomate, unsegmented sea animals. The individual, which is a member of a species of *Phoronis*, inhabits a leathery tube from which the forepart may be protruded. This region bears a horseshoe-shaped structure with many ciliated tentacles, called the lophophore, which produces a feeding current.

Phosgene (Gr. *phōs*, light; *root gen*, to produce). COCl_2 . Alternative name for carbonyl chloride, a gas discovered by J. Davy in 1811, and possessing an unpleasant pungent smell. Used in the manufacture of aniline dyes and other organic chemicals, it is formed when chloroform decomposes, and by exposing equal volumes of carbonic oxide and chlorine to the action of sunlight. It is important in chemical warfare (*q.v.*).

Phosphate Deposits. The mineral apatite is the chief primary source of phosphorus. Although widely distributed in small amounts in most types of igneous rocks and sparingly in sedimentary and metamorphic rocks, workable quantities are restricted to pegmatitic deposits in Canada; segregations in gabbro in Norway; with magnetite at Kiruna and Gellivare, Sweden; and, largest of all, in lenses of nepheline-apatite rock in the U.S.S.R. Rock phosphate also results from the leaching of bird-droppings (guano) and the redeposition of the phosphoric acid as calcium phosphate in underlying limestone. Such deposits occur on numerous Pacific islands and along the Peruvian and Chilean coasts. Other phosphatic rocks are of marine origin and are formed by the accumulations of organic remains. Commercial phosphate deposits are found in U.S.A., the U.S.S.R., Africa, various Pacific is., Christmas Is., etc.

Phosphates. Mineral deposits much used in fertilisers. The phosphate rocks found in most parts of the world consist largely

of fossilised animal remains and excreta. Rocks of this type may contain from 40 to 80 p.c. of tribasic phosphate of lime. Phosphate in its raw state is not soluble in water, and must be chemically treated and turned into superphosphate before its phosphoric acid becomes available as plant food. Phosphate-rich material containing coprolites was discovered below the chalk in Surrey by Henslow in 1845. Since then large deposits of phosphate have been discovered in many parts of the world; France with N. Africa produces most. Nauru (*q.v.*) and Ocean Island (*q.v.*) produce guano derived from sea birds. The U.S.A. has large phosphate deposits, and the U.S.S.R. mines apatite rock in the Kola pen. The use of mineral phosphates for manure began in the middle of the 19th century. In 1939 over 7 million tons of raw phosphates were used in fertilisers.

Phosphor Bronze. Term covering a group of alloys based on copper to which tin and phosphorus have been added. The alloys have a useful range of mechanical properties and good resistance to corrosion. It is convenient to subdivide phosphor bronzes into two classes: (1) Alloys containing up to 7 p.c. tin, to which phosphorus is added to deoxidise the molten alloy; these consist of a single, soft, ductile phase, and can be hot and cold worked. (2) Alloys containing more than 7 p.c. tin, to which is added phosphorus in excess of that required to deoxidise the molten alloy; these have a hard phase (δ), while the excess phosphorus forms another hard phase, Cu_3P . These alloys are used for castings.

Phosphorescence. Power of emitting light possessed by many animals. It occurs frequently among the Protozoa, jelly-fishes, worms, crustaceans, insects, and fishes, and more rarely in other phyla of the animal kingdom. The familiar phosphorescence of the sea is due to the presence of swarms of the protozoon *Noctiluca* (*q.v.*). Another well-known example is seen in the glow-worm, where the light appears to serve the purpose of attracting mates. In the jelly-fishes, phosphorescence accompanies the power of stinging, and is therefore, probably, of a warning character; while the angler fish uses it to attract the small species on which it preys. Among animals of the deep sea it serves apparently as an illuminant.

The means by which the light is produced is by the oxidation of

luciferin. This reaction, which produces light, is essentially the same as any oxidation process, but the energy produced is light only.

A number of substances continue to emit light when placed in darkness after exposure to light. Phosphorus itself does so, and this phenomenon is also due to oxidation. Barium and calcium sulphides, all minerals containing aluminium, etc., are phosphorescent. Dewar has shown that phosphorescence increases markedly at very low temperatures. It has been shown that it depends upon the presence of a metal, a soluble flux, and a sulphide of an alkaline earth. Without them phosphorescence does not exist. See Fluorescence.

Phosphoric Acid. Compound of phosphorus, hydrogen, and oxygen, H_3PO_4 . It may be made by treating bone-ash or mineral phosphate with sulphuric acid or by smelting phosphorus rock with coke to give phosphorus vapours, which are mixed with steam and condensed. It forms a viscous liquid, and is a tribasic acid forming three series of salts, e.g. NaH_2PO_4 ; Na_2HPO_4 ; Na_3PO_4 ; the hydrogen molecules being gradually replaced. The salts of the acid are called phosphates. On heating the acid it is converted into pyrophosphoric acid, $H_4P_2O_7$, and still further heating results in the formation of metaphosphoric acid, HPO_3 , a glassy solid.

Phosphorite. Variety of natural phosphate (*q.v.*) resulting, in important occurrences, from the accumulation of organic remains and bird-droppings upon desert islands, the limestone of the island rock being partially or completely replaced by calcium phosphate. This replacement is caused by the downward percolation of water which leaches out the phosphate from the organic debris and reacts with the underlying calcareous rock.

Phosphorous Acid (H_3PO_3). Acid formed when phosphorous oxide is added to water, the oxide being produced by the slow oxidation of phosphorus. A solution is obtained when sticks of phosphorus are kept exposed to moist air, but the pure acid is made by slowly passing chlorine through phosphorus melted under water. Its salts are termed phosphites.

Phosphorus (Gr. *phosphoros*, light-bringing). Chemical element (symbol P) which derives its name from its property of becoming luminous in the dark. It appears to have been discovered in 1669 by Brandt, an alchemist of Hamburg.

In 1775 Scheele, the Swedish chemist, described a method of making phosphorus from bone-ash.

Phosphorus does not occur in the free state in nature, but exists combined as phosphate. It is always found in plants, from which animals derive the phosphate found in bones to the extent of three-fifths of their weight. Large deposits of mineral phosphates exist.

Phosphorus is chiefly made by the electric furnace process. A mixture of sand, coke, and phosphate rock is heated to a high temperature when silicon dioxide displaces the more strongly acidic phosphoric oxide, which is then reduced to phosphorus by the coke.

Phosphorus is a pale yellow waxy-looking solid which readily takes fire when exposed to the air. It is converted into another variety known as red phosphorus by heating to a temperature of between 240° to 250° C. for a time. This variety is used in the manufacture of matches. Phosphorus is also used in vermin-killers, phosphor bronze, and the preparation of certain organic compounds. (See Phosphoric Acid.)

Acute poisoning by phosphorus has occurred from taking rat-poison, and among children from sucking old-fashioned match-heads. From one to two grains are likely to be fatal. When swallowed, the poison causes a garlic-like taste in the mouth and odour in the breath. Pain, vomiting, and diarrhoea follow in from a quarter of an hour to several hours. Sometimes the symptoms become steadily worse, and delirium, coma, and convulsions precede death. Treatment consists in washing out the stomach, or giving copper sulphate as an emetic. Fatty material, such as milk, should not be given, as it keeps the phosphorus in solution.

Phossy Jaw. Name for a disease of the jawbone common among workers in match factories in the days before white or yellow phosphorus was superseded by red, or by sesquisulphide. Caused by the escape of poisonous fumes, it usually began in a defective tooth.

Phot. Unit of illumination. It is the equivalent of 1.0 lumen (*q.v.*) per sq. cm. One phot equals 1,000 milliphot or 10,000 lux (*q.v.*).

Photius (c. 820-891). Byzantine scholar and prelate. Born at Constantinople of a distinguished family, he became captain of the imperial bodyguard and secretary of state under Michael III. Although a layman, he was appointed patriarch of Constantinople, 857,

deposed 867, reinstated 876, again deposed and banished 886. He died in exile in Armenia. During his second patriarchate the breach between the eastern and western churches became complete.

Photius rendered great service to classical scholarship by two works, both extant in more or less complete form: (1) *Bibliotheca* or *Myriobiblos*, containing a description of 280 works by Greek theological, historical, medical, and miscellaneous writers. It is curious that poets are wholly omitted. The *Bibliotheca* is especially valuable as containing specimens of works, some of the originals of which are entirely lost. (2) A lexicon, in alphabetical order, of the words occurring in the Greek orators and historians.

Photo-Cell. Means whereby variations in light are converted into variations in electric voltage or current. Three types are employed in practice: photo-conductive cells, photo-electric cells, and photo-voltaic cells.

The photo-conductive type is often called the selenium cell, as it depends upon the sensitivity of that metal to light. It is used as a coating about .01-in. thick, spread over a conducting metal plate, the composite disk being enclosed in a glass bulb. A typical selenium cell would decrease in resistance from 5 to 1 megohm when illuminated by 5 ft.-candles. Photo-conductive cells are used for control, communication, and measurement purposes, where the occurrence of a slight time-lag between cause and effect is not harmful, e.g. the automatic lighting of street lamps, telegraphy or telephony along light-beams, and photometry.

Photo-electric cells depend on the facts that metals when heated have the power of emitting electrons and that the alkali metals—lithium, sodium, potassium, rubidium, and caesium—give off electrons when light falls upon them. When the filament of a diode valve is replaced by a silver disk covered with a thin layer of an alkali metal, and a relatively low H.T. voltage is connected between cathode and anode, it will pass currents increasing with the light intensity.

This type of photo-cell is instantaneous in its action, and is employed for talking pictures and television. It is the one most generally employed for industrial control, a special advantage being that it combines well with a valve amplifier.

Photo-voltaic cells have an advantage over all the others in that they require no external source of power. Their construction resembles that of a selenium or copper-oxide rectifier, there being no necessity for an enclosing bulb. A typical form has a copper plate, with one surface oxidised and sputtered with a very thin layer of gold to provide the return circuit.

These cells are more sensitive than the photo-electric type. They have been used in connexion with portable photometers, photographic exposure meters, colorimeters, and such instruments.

Photo-chemistry. Branch of chemistry which deals with chemical changes due to the action of light. If a mixture of chlorine and hydrogen is kept in the dark, no chemical combination takes place, but if a beam of light be allowed to fall on the glass vessel containing the mixture, chemical combination takes place with explosive violence, hydrochloric acid being formed. Light also "reduces" many chemical salts, especially in the presence of organic substances. This fact is the basis of the operations of photography. The silver halides, i.e. bromide, iodide, and chloride of silver, are particularly sensitive to light, and these are used for the sensitive portion of photographic plates and papers.

Many other substances are sensitive to light, and some of these are employed also in photography. Light-sensitive iron salts form the basis of the ferro-prussiate paper devised by Herschel in 1840, and largely employed for making blueprints in engineering workshops. Platinum salts sensitive to light form the basis of platinotype. Another class of photochemical action is seen in Niépce's discovery that thin films of bitumen exposed to light become insoluble in the usual solvents, such as turpentine. Similarly gelatine impregnated with ammonium bichromate becomes insoluble in water after exposure to light; this reaction is the basis of the carbon process of photography.

The fundamental principle of photo-chemistry as first enunciated by Grotthuss (1818) is that only light actually absorbed causes photo-chemical changes. The principles of photo-chemistry have important applications in relation to explaining the mechanism of vision, since the sensitiveness of the eye may be attributed to the presence of a substance, visual purple, very reactive to light.

Photo-electric Cell. This is described under Photo-Cell.

Photo-Engraving. For this subject, see Process Engraving.

Photo-finish Camera. Race-finish recording camera, functioning on the photo-electric cell principle, employed in the accurate determination of the winner of a race, especially a horse race. It

was first used officially in England at Epsom racecourse, April 22, 1947, and has since been officially installed on all racecourses in Great Britain. It is intended not as a substitute for the judge's decision, but to prevent disputes, especially where the angle at the finishing post is deceptive. It assists in confirming distances separating 1st, 2nd, and 3rd runners, and is in use on greyhound racing tracks. It was used for the finish of the 1949 Derby.

The camera is fixed in a small dark room on a 30-ft. tower, 80 ft. from the rails. The judge's box is in the same structure, exactly



Photo-finish Camera. A dead-heat in a horse race recorded by the camera at Newmarket (Burwell Stakes), May 11, 1948

below the camera. Immediately facing, on the opposite side of the course, is a mirror, 7 ft. high by 6 ins. wide, which enables a photo of the runners to be taken as from the opposite side of the course.

Photographic Society, ROYAL. Society founded in 1853 for the advancement of photography and its applications. It issues the monthly Photographic Journal and quarterly and annual publications, and holds meetings, exhibitions, and conferences. Membership is open to those interested; fellows and associates must possess photographic ability. Offices, 16, Prince's Gate, London, S.W.7.

PHOTOGRAPHY: HISTORY & PRACTICE

A. Southgate Quittenton, F.I.B.P., F.R.P.S.

An account of the origins and development of photography, of the processes involved, and its applications. See also articles on Air Photography; Camera; Colour Photography; Exposure; Lens; Panchromatic Photography, etc.

Photography is a development of the 19th century, but the camera (*camera obscura*) which is its basis is old. Leonardo da Vinci found in the 15th century, that by darkening his studio and leaving a small hole, he could get an image of the scene outside projected on to a sheet of white paper held in the room. Later artists found that if a lens were inserted in the hole the image was brighter and more clearly defined; but no means existed of recording that image.

In 1802, Thomas Wedgwood discovered "a method of copying paintings on glass, and of making profiles, by the agency of light upon nitrate of silver." Wedgwood's process was described by Sir Humphrey Davy in the journal of the Royal Institution. In experiments Davy discovered that silver chloride was more sensitive to light than silver nitrate; but neither Wedgwood nor Davy found any method of fixing the image, and their pictures continued to darken on exposure to light.

In 1813, a Frenchman named Joseph Niépce discovered that the solubility of bitumen in lavender oil was affected by its exposure to light. He exposed metal plates coated with bitumen in a camera contrived from a cigar box with the lens from a solar microscope. He swabbed the exposed plate with lavender oil, and a coating of bitumen was left where the light had acted and bare metal where the bitumen was unaffected and soluble. Such plates could be etched subsequently in a bath of acid and printed from in a press. Niépce's process was therefore the ancestor of the photo-mechanical processes. Meanwhile, another Frenchman, Louis Daguerre, was experimenting, and in 1829 he entered into an agreement to collaborate with Niépce, who died, however, in 1833. Daguerre then discarded the bitumen process and evolved a new one. This involved the subjecting of a silver plate, or a copper plate coated with silver, to the fumes of iodine until it was covered with a layer of silver

iodide. The plate thus prepared, after exposure in the camera, was exposed to the vapour of metallic mercury, which formed an amalgam of mercury and silver on the plate proportionate to the light action on the silver iodide, so that the highest lights were whitest. The significance of Daguerre's process was his incidental discovery of the latent image and the possibility of developing it, the foundation of photography as now practised. Daguerreotypes, as they were called, had a tremendous vogue for some 15 years. At first they were fixed in common salt, but when Herschel called attention to sodium thiosulphate (hypo), discovered by himself in 1819, this was adopted, and remained the chief photographic fixing agent. Daguerreotype plates were later made more sensitive by the combination of bromine with iodine (Goddard) and, subsequently, chloride (Claudet). A method of gold toning devised by Fizeau improved colour and permanence.

Fox Talbot's Experiments

An Englishman, William Henry Fox Talbot, who had been experimenting since 1835 on the lines of Wedgwood and Davy, obtained greater sensitivity than they had done by washing his paper with sodium chloride before applying silver nitrate. Finding that excessive sodium chloride had an opposite effect, he used common salt as a fixing agent for a time, but in the end came to hypo, which indeed had been used in 1837 by another English pioneer, J. B. Reade. Fox Talbot's first results were a simple process, printed out in the camera; he communicated his discoveries to the R.S. in 1839. But within two years he had patented his calotype process, in which a latent image was developed with silver nitrate and gallic acid. His pictures were negatives from which any number of positive prints could be made by printing them in contact with paper similarly sensitised, hence Fox Talbot may be considered the father of photography. Some of his original negatives are in existence and still yield beautiful prints. Herschel, discoverer of hypo as a fixing agent for dissolving the unused silver salts, is credited with the coining of the words photograph and photography, and with being the first to use the terms negative and positive in their photographic sense.

Paper negatives, in spite of efforts to make them translucent, gave a very slow printing speed

and recorded the grain of the paper negative in the positive print. Niépce de St. Victor, a nephew of Joseph Niépce, discovered a method of coating glass, using albumen (white of egg) as an initial coating, subsequently iodised and sensitised in silver nitrate.

The Wet Collodion Process

Scott Archer in 1851 discovered the wet collodion process, still used in making negatives for photo-engraving. A solution of nitro-cellulose in ether and alcohol containing iodide is poured over the glass, the iodide forming silver iodide when the plate is bathed in a solution of silver nitrate. This sensitive plate has to be exposed and developed while wet, and can be used away from the studio only with a portable darkroom. Its improvement over the calotype process in sensitivity, clearness, and the grainless character of the negatives produced outweighed the disadvantage that it must be used wet. Dry collodion plates were actually put on the market, though they did not come into general use. The next advances were to form silver bromide in the collodion itself, making unnecessary a separate sensitising bath (Sayce and Bolton, 1864); and to utilise the greater energy of an alkaline developer instead of the acid baths previously used (Russell, 1862).

Dr. Richard Maddox in 1871 invented a coating compound of silver salts emulsified in a solution of gelatine, and attempts were made to produce emulsions with which photographers could coat their own dry plates, as they had been in the habit of coating wet ones, until in 1877 J. W. (after Sir Joseph) Swan put ready coated dry plates on the market. In 1872 Vogel, of Berlin, discovered that the addition of a dye to the emulsion made it sensitive to green and yellow rays; formerly all photographic materials had been sensitive to violet and blue rays only, with a consequent falsifying of tone rendering in coloured subjects. In 1891, Eastman and Walker produced the first film, that is they coated celluloid instead of glass with the emulsion. After that, the basic form of photography remained unchanged, except for the introduction of direct colour photography, attention being turned to increasing the sensitivity of negative materials to all the colours of the visible spectrum and beyond, into the invisible infra-red, ultra-violet, and rays of even shorter wavelength; to producing ever faster emulsions,

reducing granularity, and improving methods of processing.

Printing papers in the early days of photography were coated similarly to the negatives. The first paper produced essentially for printing, and in use during 1850-92, was coated with albumen and ammonium chloride and sensitised by the photographer immediately before use by floating it on a bath of silver nitrate. The print was made by contact in daylight, and the unpleasant reddish tone was modified by toning in gold chloride before fixing in hypo.

From 1891 a gelatine emulsion devised by Sir William Abney was used for a type of paper, still used, called P.O.P. (printing-out paper). Subsequently three varieties of development papers were evolved and came into general use: gaslight paper (*q.v.*), bromide paper (*see Bromide*), and chlorobromide paper, which is between the others in speed and is suitable for either contact or projection printing.

Gum and Grease Process

The gum-bichromate process, which yields prints of superlative richness in the hands of a skilful worker, is derived from the work of Niépce and involves the coating of a paper with a solution of gum arabic to which has been added potassium bichromate and a quantity of finely ground pigment. The paper is dried in the dark and exposed in contact with a negative to strong daylight. The print is developed by floating it face downwards on a bath of warm water; the portions of the coating unaffected by light, being soluble, are dissolved away, leaving the image in pigmented insoluble gum. In the bromoil process a bleached print treated with a tanning solution is made to accept hand-applied greasy pigment in inverse proportion to the resistance offered by the wet gelatinous image; but such processes are not in normal commercial use.

The effect of light on the solubility of bichromated gelatine is exploited in the carbon and carbon printing processes (*see Carbon Process*).

The extreme sensitivity and latitude of current negative emulsions has led to the virtual abandonment of dish development by inspection in favour of standard time and temperature development in a light-tight tank. Increasing use of small negatives has made printing by projection more general than contact printing, and fully automatic enlarging apparatus has been developed.

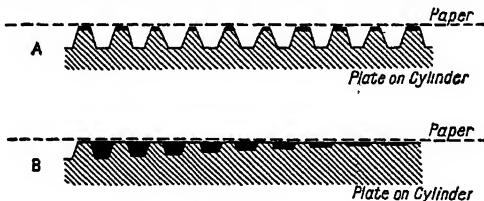
Apart from its use for portraiture, pictorial work, advertising, illustrated journalism, and amateur snapshots, photography has been made to serve industry, science, and medicine. Radiography is extensively used to test forgings, castings, and welds for internal flaws. Photo-elastic stress analysis is an engineering application. A scale model of the object to be tested is made in a suitable transparent material. Loads proportionate to those acting on the real body are applied to the model and a photographic record is taken of the pattern of light and dark bands which appears when the model is viewed in polarised light. These bands indicate the stresses. When a sheet of metal or plastic has to be cut or drilled to a standard shape to form a template the original drawing can be photographed and projected direct on to the material to be used, which has previously been coated with a light-sensitive emulsion; this is called photo-lifting. The introduction of high voltage gas discharge lamps giving an intense flash of very short duration has made it possible to take action photographs, e.g. of machinery running at high speed, a field in which the high speed cine camera, recording at up to 3,000 frames per sec., has been used. Aerial survey work is now a recognized aid to the cartographer. Medicine and forensic science use the camera extensively in many fields.

Bibliography. Photography as a Scientific Implement (a collective work), 1923; Photography Today, Spencer, 1936; Photography, Principles and Practice, Neblette, 1943; Photography: Theory & Practice, L. P. Clerc, 1944; History of Photography, J. M. Eder, trans. Ed. Epstein, 1945; Handbook of Photography, Henney & Dudley, 1946.

Photogravure (Gr. *phōs*, light; Fr. *gravure*, engraving). Photo-mechanical process of making intaglio plates from which impressions are printed either by hand or machine. The method was developed as an application of photography during the second half of the 19th century by such workers as Fox Talbot, Sir Joseph Swan, and particularly Karl Klic. Later modifications gave greater speeds of printing, more exact technical control, and reduction in the cost of the process. At first "grain" photogravure, a modification of copperplate engraving, was used for the reproduction of original paintings; but this is a slow process used now only in limited edi-

tions. Rotary photogravure, much used for illustrated periodicals and magazines, is far more common. Anything that can be photographed can be reproduced by photogravure.

A rotary photogravure printing image is composed of tiny square cells etched into the surface of a copper plate or cylinder, the cells being separated by thin walls of metal. These cells are etched to



Photogravure. Exaggerated diagrams illustrating, in section A, how the surface of the printing plate takes the ink in the half-tone; B, how the ink remains in the recesses of the cylinder in photogravure

different depths according to the degrees of light and shade in the illustration; varying tones are obtained by the different quantities of ink required to fill these cells.

To produce large editions of illustrated magazines, transparent photographic positives of the original subjects are made and re-touched where necessary. These positives, in allotted positions, are photographically printed through on to light-sensitive "carbon tissue" of sensitised gelatine on a paper base. Type matter for text and captions is treated in a similar way. The images so formed in the tissue are now divided into tiny squares of equal size by exposing the tissue under a screen with opaque black squares separated by narrow transparent lines. This screen generally has 150 lines to the inch.

After the two photographic exposures, the carbon tissue is carefully pressed into position on a polished copper-plated cylinder. It is developed with hot water, and the paper backing removed, so as to obtain a relief image of the originals, in which the light tones of the illustrations are represented by thick gelatine and the dark tones by thin areas, the entire image being ruled into fine squares by the use of the screen. This image is dried, and those portions of the copper that are not to be etched, for example the margins, are covered with a suitable varnish. The cylinder is etched in solutions of ferric chloride which penetrate the

gelatine and dissolve out the copper image in the form of innumerable square pits of varying depth according to the tones.

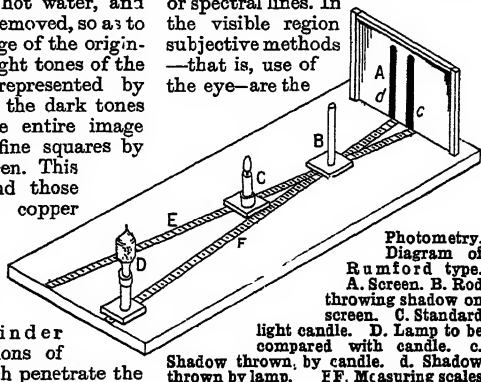
For hand printing, a stiff ink is worked thoroughly with a dabber into the warmed plate. Surplus ink is then wiped off the surface, first with canvas and finally with the palm of the hand. The paper is damped, laid over the inked plate and the impression taken by pulling the whole through a copper-plate press.

In the rotary machine process, the cylinders revolve in a trough of thin, liquid ink, which fills up the tiny cells. Superfluous ink is mechanically scraped off the non-image surface of the cylinder as it revolves by a blade. A continuous web of paper is passed round a rubber-covered roller pressing against the printing cylinder, so that the ink in the indentations of the copper cylinder is transferred to the paper. When dried it travels to the second printing cylinder, where the same operations are performed, but on the other side. For colour work, units composed of two printing cylinders and driers are duplicated or triplicated.

Rotary intaglio printing is not confined to illustrations. It is also used for printing on textiles and for wallpaper. See Colour Printing; Half-tone; Linotype; Printing.

Photo-lithography. Method of reproducing a subject photographically on to a flat surface from which the subject can then be printed lithographically. See lithography.

Photometry (Gr. *phōtos*, of light; *metron*, measure). Measurement of intensities of light sources or spectral lines. In the visible region subjective methods—that is, use of the eye—are the



Photometry. Diagram of Rumford type. A. Screen. B. Rod throwing shadow on screen. C. Standard light candle. D. Lamp to be compared with candle. E. Shadow thrown by candle. F. Shadow thrown by lamp. E. F. Measuring scales

most direct, but the sensitivity of the eye varies with wavelength, so that only sources of similar wavelength can be accurately compared. Outside the visible region such detectors as photo-cells and thermopiles replace the eye. Photographic methods of recording may be used in the near infra-red, visible, and ultra-violet regions, and this is especially useful if the sources of light are fluctuating. In the simple type of photometer, used to compare the candle-powers of lamps, use is made of the Inverse Square Law (*q.v.*). According to this law, if two sources of candle-powers c_1 and c_2 produce equal illumination at distances d_1 and d_2 respectively, then—

$$\frac{c_1}{c_2} = \frac{d_1^2}{d_2^2}$$

The Bunsen photometer uses a white screen with a grease-spot at its centre. The sources of light are mounted at opposite sides of the screen. The positions of the lamps are adjusted until the grease spot is no longer distinguishable; the ratio of the candle-powers of the lamps will then be the ratio of the squares of their respective distances from the screen.

Photomicrography (Gr. *phōtos*, of light; *mikros*, small; *graphos*, written). The process of obtaining greatly enlarged photographs of small objects. It is sometimes confused with its converse, microphotography, which entails the photographing of subjects of comparatively large area on to tiny negatives. Enlarged negatives up to 20 or so diameters may be produced without a microscope by means of a short-focus lens and a camera with long bellows extension. Such low power work is known as photomacrography (Gr. *makros*, long or great). In photomacrography the lens acts conversely to usual photographic practice in that its covering power can be limited to the area of the subject irrespective of the size of plate or film.

When large magnifications are required, the microscope is brought into use. An extensible camera may be attached to the top of the microscope by means of a sleeve, allowing movement of the microscope barrel within the sleeve for focusing purposes; or an ordinary hand camera may be focused and set at infinity and clamped in position with the lens just above the eyepiece of the microscope after the latter has been focused, extraneous light being excluded by a surrounding sleeve. In a

third method a fixed-focus camera embodying an eyepiece may be fixed to the top of the microscope from which the usual eyepiece is removed. A similar arrangement may embody an attachment by which a miniature roll-film camera replaces the fixed-focus type.

Still another method of photomicrography, carried out in a dark room, employs a prism set above the eyepiece, which projects the image at 90° on to an easel bearing a photographic plate situated at a suitable distance away. Filters for photomicrography are usually placed over the light source rather than over the lens or objective, and, unless apochromatic objectives are used, a green light and orthochromatic plates give the best results. For the study of biological processes, moving pictures have been taken through a microscope by normal cinematographic methods. See *Microscope*; *Metallography* illus. Consult *Photomicrography, Theory and Practice*, C. P. Shillabeer, 1943; *Practical Photomicrography*, Barnard and Welch, 1947.

Photon. The unit of radiation energy. A light particle or corpuscle or quantum, it is considered as a proton in contact with an electron, the distance between the two being equivalent to the radiation of the electron. Every form of radiation, cosmic, gamma, X-ray, Hertz, etc., releases energy of a specific photon value. The average radio aerial transmits energy equivalent to 10^{32} photons per sec. See *Quantum Theory*.

Photosphere. In astronomy, the visible surface of the sun. It consists of highly incandescent gas at a temperature of about 6,000° C. and gives a continuous spectrum. In a powerful telescope the photosphere is seen to be mottled, the rapidly changing granulations observed being probably the tops of rising convection columns of hot gas about 500 m. across. Where these are absent the resulting "pore" looks relatively dark. Still larger dark areas are the so-called sunspots, first noticed by Fabricius in 1610. These spots vary in size, from a few hundred miles across to huge areas thousands of miles wide, and sometimes last many months. In the neighbourhood of many sunspots there often appear bright streaks or patches in the photosphere. These bright streaks are known by the name of faculae, or little torches. They are more distinctly seen near the edge of the sun, where the general bright-

ness of the surface is lessened by the greater thickness of the absorbing atmosphere. The photosphere does not revolve evenly, the lower latitudes moving faster than the higher, a fact established by observation of the time taken by the spots to travel across the face of the sun, and confirmed by spectroscopic measurements of the speed of rotation at different latitudes. See *Sun*.

Photosynthesis (Gr. *phōs*, light; *syn*, with; *tithenai*, to put). The normal green plant takes up from its environment simple inorganic materials of low energy content and from them builds up its body, which consists of complex organic substances of high energy content. Thus endothermic reactions must occur. The energy necessary for these reactions is derived from light by the chlorophyll in the chloroplastids, in some instances directly, in others indirectly. Those syntheses in which light energy is used directly constitute photosynthesis. One outcome of this process in many leaves is the accumulation of starch, which can readily be shown to occur only in the presence of chlorophyll, light, and carbon dioxide. On this account it was at one time thought that starch was photosynthesised in the plant in the presence of illuminated chlorophyll, acting as a catalyst, from carbon dioxide, derived from the air, and water taken in from the soil, oxygen being produced simultaneously as a waste product.

There is no doubt that oxygen is produced, but it is not now considered probable that starch is the primary photosynthetic product. It has a very large molecule, and it seems more probable that relatively small molecules would be produced first, later to react to give larger ones. Moreover, many leaves never contain starch, and even in those that do other simpler carbohydrates are present, *e.g.* glucose. The view that formation of simple sugars precedes formation of the more complicated carbohydrates is substantiated by the fact that the quantities of the former fluctuate less with alternation of day and night than do those of the latter. Even glucose is somewhat too complex to be easily accepted as a first photosynthetic product, and research suggests that formaldehyde is the precursor.

Chlorophyll undoubtedly acts as a photocatalyst. Light of visible wavelength is essential for the process; but neither of the primary reactants, carbon dioxide

or water, absorbs appreciable quantities of such light, and so by itself cannot obtain thence energy for reaction. The process goes on most favourably in light of wavelength $650\text{--}700\mu$, i.e. red light, and this part of the spectrum is most strongly absorbed by chlorophyll. Thus it is concluded that chlorophyll absorbs energy from light in the visible part of the spectrum and passes it on to the primary reactants, probably in the infra-red part of the spectrum, and perhaps while reactants and pigment are in some form of combination.

If as a result formaldehyde is liberated in an active form it might readily polymerise into glucose, the latter condensing into maltose, starch, and cellulose. Moreover, since it is known that in suitable conditions a pure solution of glucose becomes partially converted into fructose, the formation of fructose would provide material for reaction with some of the unchanged glucose to form sucrose and for polymerisation into inulin.

The rate of photosynthesis increases within limits with increasing carbon dioxide concentration and rising light intensity. Since the one is a raw material and the other supplies the energy, this is as would be expected. On the other hand, temp. affects the rate much more than would be expected in a purely photochemical reaction. For such the temp. coefficient is usually less than 1.4, but the rate of photosynthesis may be more than doubled for each 10°C . rise up to $30^\circ\text{--}40^\circ\text{C}$., giving a temp. coefficient of more than 2. This is much nearer that given by ordinary chemical reactions, and on this account it is generally held that bound up with the photocatalytic reactions there are others dependent for their rate on temp. and on light only so far as photocatalysis supplies the reactants. These reactions are regarded by some as constituting the dark phase of photosynthesis in contrast to the light phase in which photocatalysis occurs. At temps. above $30^\circ\text{--}40^\circ\text{C}$. increasing temp. generally results in a falling off in the rate of photosynthesis.

Phraates. Name of several kings of Parthia. The best known was Phraates IV, who, on coming to the throne, 37 B.C., eliminated possible rivals by murdering his father, his 30 brothers, and even one of his sons. He successfully defended his kingdom against a

Roman expedition under Antony, 36 B.C., but his tyranny caused a revolution and he was expelled. Reinstated with the help of the Scythians, he drove out Tiridates, who had been made king. The latter, however, took with him in his flight to Rome the younger son of Phraates. This boy the emperor Augustus agreed to restore to his father on condition that the Parthians gave up the standards they had taken after the defeats of Antony and of Crassus at Carrhae in 53 B.C. Phraates was poisoned by his wife, Musa, c. 4 B.C. *Pron.* Prayayteez.

Phrase (Gr. *phrazein*, to speak). Literally, two or more words expressing a single idea. In music the term means much the same. Music possesses melodic progressions and harmonic cadences, which largely represent the comma, semicolon, and full stop, and define the subordinate clause, the phrase, and the complete sentence. In musical performance the word phrasing also includes the artistic attachment and detachment of the tiny figures or sub-clauses, the proper use of legato, and the delivery of accents in due proportion.

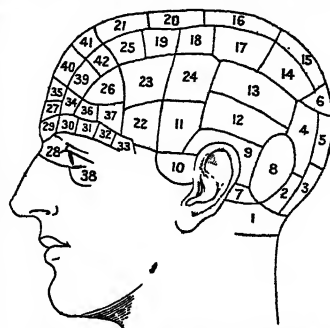
Phratry (Gr. *phratría*, brotherhood). Tribal or kinship division. In early Athens the tribe comprised three phratries, which developed into politico-religious fraternities. An Australian tribe usually embraces two exogamous moieties, each with a totem-name; for instance, Eagle-hawk and Crow, Emu and Kangaroo. Each phratry includes two or four exogamous classes, thereby securing an equitable distribution of the food-stock. Some N. American Indian tribes were organized into two or more phratries, each comprising one or more matrilineal clans or patrilineal gentes.

Phrenic Nerve (Gr. *phrēn*, diaphragm). Nerve formed by the third and fourth cervical nerves and a branch of the fifth on each side of the neck. It passes down the neck, and, having traversed the cavity of the chest, supplies the diaphragm or large horizontal muscle, which separates the thoracic and abdominal muscles. Division of the phrenic nerve leads to paralysis of the corresponding half of the diaphragm and may cause serious disturbance of respiration. *See* Nerve.

Phrenology (Gr. *phrēn*, mind; *logos*, science). So-called science having for its basis the supposition that mental faculties and traits of character can be gauged from the shape and size of the skull. It is

claimed that the brain is a congeries of organs, through each of which a distinct power of intellect is manifested. The strength of each mental organ is judged by the extent of the cerebral development, due allowance being made for quality of brain, combinations of organs, etc.

The founder of phrenology was F. J. Gall, who sought to demonstrate that there was a concomitance between talents and dispositions,



Phrenology. Diagram indicating the sections into which the skull is divided phrenologically. *See* text

and particular forms of head. Gall mapped out, as it were, the surface of the skull into twenty-six patches, and named them according to the mental or moral faculties he supposed them to represent. J. G. Spurzheim, a German physician, studied the system under Gall, elaborated it, and introduced phrenology to Great Britain. He increased the faculties to thirty-five, and contemporary phrenologists have added to this total a further seven.

The forty-two sections into which most phrenologists would divide the skull are as follows. The position of the sections is indicated by the diagram.

1. Amativeness. 2. Conjugality.
3. Parental Love. 4. Friendship.
5. Inhabitiveness. 6. Continuity.
7. Vitativeness (love of life). 8. Combativeness. 9. Destructiveness.
10. Alimentiveness. 11. Acquisitiveness. 12. Secretiveness. 13. Cautiousness. 14. Approbateness.
15. Self-esteem. 16. Firmness.
17. Conscientiousness. 18. Hope.
19. Spirituality. 20. Veneration.
21. Benevolence. 22. Constructiveness. 23. Ideality. 24. Sublimity.
25. Imitation. 26. Mirthfulness.
27. Individuality. 28. Form. 29. Size. 30. Weight. 31. Colour. 32. Order. 33. Calculation. 34. Locality. 35. Eventuality. 36. Time.
37. Tune. 38. Language. 39. Causality. 40. Comparison. 41. Human Nature. 42. Agreeableness.

Whatever vogue phrenology obtained in Great Britain is due, after Spurzheim, to the Scottish brothers, George and Andrew Combe, who did much to make the system popular. Dr. Bernard Hollander, through his books on the subject, raised the system as near to the level of a science as it is ever likely to become. As an indication, on broad lines, of the power of the faculties, phrenology may be useful, but its specific claims are rejected by science. Even if the localisation of the functions is admitted, there is little or no proof that they affect the form of the skull or that the form of the skull indicates the power or quality of the brain.

Phrygia. Ancient country of Asia Minor. It comprehended roughly the tableland of modern Anatolia as far E. as the river Halys, but its confines varied at different times. It was inhabited by the Phryges, who, according to the researches of archaeologists and ethnologists, in agreement with ancient tradition, were warlike settlers of Aryan descent from Thrace. The inhabitants displaced by these invaders, probably about 1200 B.C., appear to have been of the same mixed race as the Hittites, to whose empire they may possibly have belonged.

Tradition, again confirmed by modern research, asserts the existence of a powerful Phrygian monarchy, beginning at an unknown date and lasting till the beginning of the 7th century B.C., when it was overthrown by the great Cimmerian invasion. The names of Midas and Gordius, well known in legend, are associated with this Phrygian monarchy. When the Cimmerii were driven out by Alyattes, founder of the Lydian empire, Phrygia passed under the dominion of the latter, to fall in turn under that of the Persians, when the Lydians were subdued by Cyrus.

After the overthrow of the Persian empire by Alexander, Phrygia became part of the Seleucid kingdom, and it was during this period, about 260 B.C., that the invasion of Asia Minor by the Gauls resulted in a slice of Phrygian territory, known henceforth as Galatia, being settled by Gauls. Eventually Phrygia became incorporated in the Roman empire. The music of Greece owed much to Phrygia, which was devoted to the wild orgiastic cults of Cybele and Dionysus.

Phrygian Mode. In music, third of the church modes, E being

its final and C its dominant. The semitones fall between the 1st and 2nd, and the 5th and 6th degrees. The Phrygian cadence (minor key only) is when the first inversion of the subdominant precedes the dominant chord.

Phrynē. Greek courtesan of the 4th century B.C. She sat to Apelles as model for his great picture of Aphrodite rising from the sea. Indicted on a charge of profaning the Eleusinian mysteries, she was defended by the orator Hyperides, who is said to have secured the verdict in her favour by rending her robe and exposing her charms.

Phrynichus. One of the oldest Greek tragic poets, a native of Athens. His best-known plays, in which he was the first to introduce dialogue, were the Capture of Miletus by the Persians, which so affected the audience that all future reference to it was forbidden; and the Phoenician Women, a lament for the defeat of Xerxes at Salamis, put on the stage by Themistocles to glorify his share in that event. Another Phrynichus, a sophist of Bithynia, lived in the 2nd century A.D. He was the author of a work called *The Atticist*, containing a collection of Attic and non-Attic expressions.

Phthalic Acid, $C_6H_4(COOH)_2$. White crystalline substance manufactured from naphthalene. The naphthalene is oxidised with sulphuric acid in the presence of mercury. Phthalic acid may also be made by the alkaline hydrolysis of phthalic anhydride. It is a dibasic acid, sparingly soluble in water and ether but soluble in alcohol. Phthalic anhydride, obtained by air oxidation of naphthalene using vanadium as a catalyst, is used in the manufacture of dyes and for making phenolphthalein.

Phthisis (Gr., wasting away). Literally, disease accompanied by much wasting of the tissues. The term is now restricted to tuberculous disease of the lungs. See Tuberculosis. *Pron.* thy-sis or ty-sis.

Phulkian States. Three Sikh states of India, now part of the Patiala and E. Punjab union. They occupy a semi-arid area between the Jumna and the Sutlej, N. of Rajputana. The chief crops are native food grains. The rulers were all direct descendants of Phul (d. 1652), who ruled over the whole area. The states came under

British protection in 1809. See Jind; Nabha; Patiala.

Phumibol Aduldet (b. 1927). King of Siam. Son of the prince of Songkhla, he was educated at Bangkok and Lausanne. He succeeded his brother King Ananda Mahidol, who died in mysterious circumstances, June 9, 1946. His marriage in 1950 to the daughter of the Siamese ambassador in London was followed by his coronation as Rama IX.

Phycomyceteae. Division of fungi consisting of single-celled threads, which form a mould-like feltwork. The familiar white mould (*Mucor mucedo*) on jam is a good example. The erect branches that arise from the feltwork end above in a globular head, which is filled with the dust-like spores. The potato-blight (*Phytophthora infestans*) and the salmon disease (*Saprolegnia ferax*) are also included in this group.

Phylactery or **FRONTLET** (Gr. *phylakterion*, safeguard). Among the Jews, strips of parchment in-



Phylactery and thongs by which it is bound to the forehead or arm

scribed with passages from Ex. 13 and Deut. 6, enclosed in a black calf-skin case, and fastened by thongs to the forehead or left hand or arm, the command in Deut. 6, v. 8, being literally interpreted. Used as early as the 3rd century B.C., and alluded to by Josephus, phylacteries, or tephillin, by reminding the wearer of the Divine law, served to protect him against sin. Modern Jews wear them on an undergarment called a *tallith* or prayer-veil. They are not worn by the Karaites, and are alluded to only once (Matt. 23, v. 5) in the N.T. The word is sometimes used to describe a case containing relics of the dead.

Phyllite (Gr. *phyllon*, leaf). In geology, a group of metamorphosed clay rocks resembling slates, containing muscovite or white mica. Though the rock splits readily, it is uneven in cleavage, and too soft to use for general building purposes. Phyllites are found among older rocks; they are associated with regions where folding has occurred.

Phyllocactus. Small genus of leafless succulent shrubs of the family Cactaceae, natives of tropi-

cal America. They have flattened green stems and branches with notched edges. From the notches are produced the large, showy, red, rose or white flowers, which have a tubular calyx, and numerous petals and stamens, the long style spreading at the top into the many-branched stigma. Several of the species have flowers from six to 12 ins. across.

Phylloxera. Genus of insects of the family Hemiptera, closely allied to the green-fly or aphids. One species, *P. vastatrix*, is a major pest of the grape. It entered Europe about 1863 in vines imported from N. America, and caused enormous damage especially in France. The insect produces galls on the lower surface of the leaves, and knots or swellings on the roots, which may entirely decay. The root forms give rise to males and females. Eggs are laid on the bark of the vine, hatching the following year, when the young insects pass to the leaves where they multiply parthenogenetically and give rise to the galls already noted. Later in the season some of the gall-formers pass to the roots, and it is these which cause the main damage. Certain American vines are not greatly affected by the root form of *Phylloxera* and, by grafting European vines on to American stocks, damage has been greatly reduced.

Phylogeny (Gr. *phylon*, race; *genesis*, origin). Biological term for the study of those parts of an animal which may be expected to throw some light upon the origin of a race or species. See Embryology.

Phylum (Gr. *phylon*, race). The largest and most inclusive groups into which members of the plant and animal kingdoms are classified; such as Pteridophyta, the fern group, or Chordata, animals with backbones. See Animal: Classification.

Physic (Gr. *physis*, nature). Term meaning the science of medicine. It survives in the official titles of certain professors and others, also in the term physician; but in general use it has been supplanted by the word medicine. Physic garden is a term which was used formerly for a botanic garden. A notable physic garden is the Chelsea Botanic, given to the Apothecaries' Society in 1721. See Medicine; Sloane, Sir Hans.

Physical Society. British scientific body. Founded in 1877, it has numbered among its presidents, Lord Kelvin, Sir Oliver Lodge, W. H. Bragg, Sir A. Edington, Lord Rayleigh, and Sir

Charles Darwin. Its offices are at 1, Lowther Gardens, Exhibition Road, London, S.W.7.

Physical Training. Systematic exercise for the promotion of health and the development of the body. The earliest form of physical training or physical education was that practised by the ancient Greeks in the palaestra (*q.v.*), and consisted chiefly of running, jumping, wrestling, and discus throwing. The Greek example was followed by the Romans, and later various kinds of physical training, mostly of an athletic description, were adopted by other European countries; but it was not until the second half of the 18th century that the value of systematic methods was fully appreciated.

Schools of physical culture were established in Germany, Denmark, and elsewhere, one of the most celebrated of these being the Royal Central Institution of Gymnastics, founded in Stockholm in 1814 by Per Henrik Ling, to whom the present high standard of Swedish physical instruction is largely due. His example was followed by Adolf Spiess in Germany, which country much developed its system in the second quarter of the 19th century.

The development of the muscles is not the only consideration in systematic physical training, and careful attention has to be given to the brain, the bones, the ligaments, and the organs. Methods vary according to the country in which they are practised, and the exercises may be performed with or without apparatus.

The Swedish system, often referred to as "free movements," is practised without apparatus, and is now adopted in Great Britain. It forms an important part of the training of the British soldier known as "P.T.," and the basis of the syllabus of physical exercises for schools issued by the ministry of Education. It is divided into groups, each group concentrating on the development of a certain part of the body—the neck, trunk, arm, leg, foot, ankle, etc.—and has the advantage over other systems that it can be practised where space is limited. But in England, as in other countries, *e.g.* France and the U.S.A., the "free movements" are combined with exercises for which appliances are necessary.

Physical training now forms part of the curriculum in the schools of most countries, the pupils of British schools usually practising recreative gymnastics, *i.e.* exercises given in the form of recrea-

tion, such as musical drill. Correct breathing is a vitally important factor in all branches of physical training, and certain exercises consist entirely of inhaling and exhaling. Much benefit may be derived by taking 10 to 15 minutes' Swedish drill night and morning, but where the exercises are performed indoors a window should always be opened. See Drill; Eurhythmics; Gymnastics; Swedish Drill; also *illus.* p. 6494.

Physical Units. Units of measurement used in commerce and scientific work. Most of them are based on the three fundamental units of time, mass, and length. See International Units.

Physician. One who practises medicine. At one time qualifications to practise medicine or surgery in the U.K. could be given separately, but under an Act of 1886 no person can be registered as a medical practitioner unless qualified in medicine, surgery, and midwifery. See Medicine.

Physicians, ROYAL COLLEGE OF. Medical corporation founded by Henry VIII in 1518. Linacre was



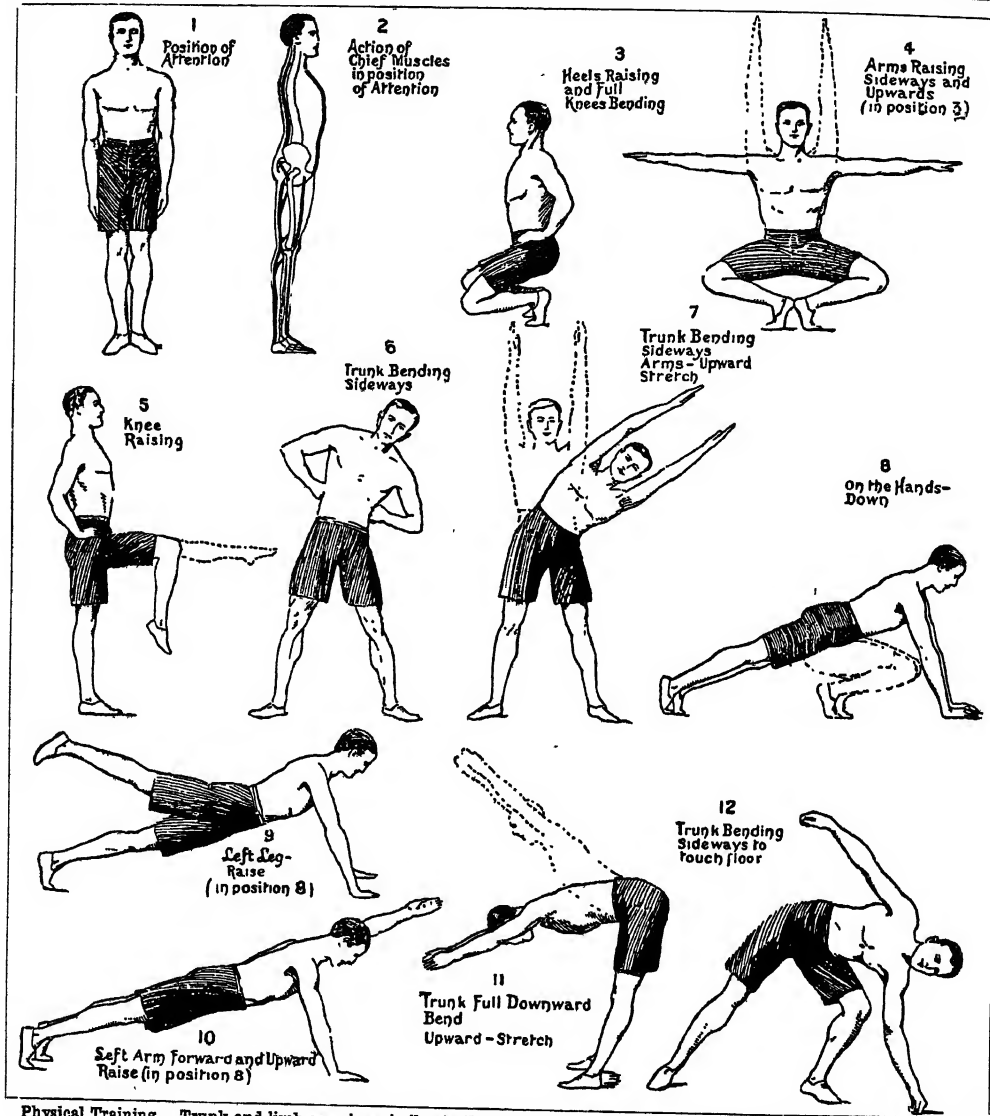
Royal College of Physicians arms

its first president. The college was for many years in Warwick Lane, but now occupies a handsome building in Pall Mall East, London. It possesses a fine library containing many rare books, and has an interesting collection of objects associated with great physicians of the past, including portraits. The college consists of licentiates, members, and fellows. The first two are admitted by examination, licentiates being usually physicians who devote themselves to general practice, while members are generally consultants. Fellows of the college are elected from the members in recognition of professional distinction. They are prohibited from suing for fees. The college of physicians issues an official vol., *The Nomenclature of Diseases*.

The Royal College of Physicians of Edinburgh is a Scottish medical corporation founded in 1681. Its present constitution dates from 1861. It unites with the Royal College of Surgeons, Edinburgh, and the Royal Faculty of Physicians and Surgeons, Glasgow, the



Royal College of Physicians of Edinburgh arms



Physical Training. Trunk and limb exercises similar to those adopted as part of the P.T. scheme in English schools and in the British fighting services, and particularly suitable for daily use where space is limited. See text p. 6493
By courtesy of H.M. Stationery Office

to conduct examinations and grant degrees in medicine and surgery in Scotland. Its headquarters are in Queen Street.

The Royal College of Physicians in Dublin was founded in 1654 by Dr. John Stearne, fellow and professor of physic, Trinity College, Dublin, and incorporated by royal charter, 1667. It was re-incorporated in 1692 under the title of The King's and Queen's College of Physicians in Ireland, and in 1890 the title of Royal College of Physicians in Ireland was conferred by supplemental charter. Licences and de-

grees are generally accepted in the U.K. as in Eire.

Physic Nut (*Jatropha purgans*). Shrub or small tree of the family Euphorbiaceae. It is indigenous to tropical America. Its alternate leaves are heart-shaped or three to five-lobed. The small green flowers form small, loose clusters. The black, fleshy berry has three oil seeds with the flavour of almonds. The expressed oil is used in lamps, and in medicine as a purgative.

Physics. General name for the sciences based on the physical manifestations of the various forms

of energy and the properties of matter. The common division of physics is into heat, light, sound, electricity, magnetism, and the properties of matter. The first five are different forms of energy, mutually convertible, and developments in nuclear physics indicate that it is not improbable that matter itself is a further modification of the same fundamental component. While for convenience the natural sciences are still treated as entities, the dividing lines between them are increasingly indeterminate. Broadly speaking, it may be said

that physics comprises the trunk which unifies the whole system of natural science.

Thus, chemistry is so bound up with the properties of matter and changes in energy distribution that it could quite properly be regarded as a specialised branch of physics. All chemical reactions are dependent upon the establishment of an energy equilibrium under the existing conditions, and if these change the course of the reaction may be altered or even reversed. An instance of the practical application of the reversibility of chemical reaction is the lead accumulator, which is of great importance in practical physics and is familiar to nearly everyone in connexion with motor cars or wireless sets. Geology depends on the use of various branches of physics, particularly optics, to interpret the structure and history of the earth's crust. Astronomy is entirely dependent on the knowledge of the properties of light; while biology involves the application of physical methods to living cell structures.

Mathematics is the means of expressing the fundamental laws of physics which have been derived from observed phenomena. The further mathematical development of these laws has made it possible to deduce many properties of matter from theoretical considerations before they could be experimentally demonstrated. This has helped research work to proceed along systematic lines and produced a very much more rapid increase in knowledge than could have resulted from a continuance of the haphazard methods which were perforce employed by the pioneers responsible for the original observations upon which the fundamental laws were founded. The most spectacular progress has been in the field of the structure of matter. The transmutation of one element into another has ceased to be the alchemist's dream and become the physicist's achievement. Enormous possibilities became obvious in the release of energy by controlled atomic fission.

The Institute of Physics, founded in 1920 under the auspices of the Faraday society, the Optical society, and the Physical society of London, has done valuable work in coordinating the efforts of the numerous bodies engaged in the study and application of physical science.

Separate articles in this Encyclopedia describe the scope and use of the various physical sciences.

See Electricity; Heat; Light; Magnetism; Matter; Optics, etc.

Peter F. F. Clephane

Physiocrats (Gr. *physis*, nature; *kratein*, to rule). An 18th century school of French economists. Founded by François Quesnay (q.v.), they taught that the land is the source of all wealth, and agriculture and mining the only industries that produce wealth. They were strongly opposed to the mercantile system then dominant in France and to a lesser extent in England, and demanded that all taxation should be paid from the produce of the land. Their doctrines, put forward earlier by Richard Cantillon, were extended by Quesnay and his friends, calling themselves the Economists. They were a considerable influence in the development of the "single tax" ideas of Henry George (q.v.). Dupont de Nemours, one of the school, was responsible for the name. *See* Smith, Adam. *Consult* The Physiocrats, H. Higgs, 1897.

Physiognomy (Gr. *physis*, nature). Art of judging character from external features, especially the face. Aristotle wrote about it, finding a certain resemblance between men and the qualities of the animals that in feature they resembled. Many other writers, both in classical times and later, dealt with the subject, and it was a popular subject for theories of all kinds. Professors of physiognomy sprang up, many of them charlatans, and in 1743, in England, an Act was passed providing that all those pretending to be skilled therein should be punished. There is, however, a modern and more scientific form of physiognomy, which may be described as a study of the emotions as expressed by the muscles. This is useful in criminology. *See* Criminology; Phrenology; Psychology.

Physiography (Gr. *physis*, nature; *graphein*, to describe). Science which deals with the earth and its place in nature. As a comprehensive study it is chiefly concerned with the coordination of the results of other sciences: from astronomy it accepts the story of the earth as a planet; from geology the account of the structure of the rocks; from meteorology and oceanography the sum of our knowledge of the air and the sea. With these fundamentals it coordinates the facts of physical geography, and includes some account of human activities, and in doing so leads to the more comprehensive study of man in relation to his environment.

Physiology. Branch of biology which deals with the functions, as distinct from the structure, of living organisms, whether plants or animals. The physiology of plants is usually included in the science of botany, and the physiologist is primarily concerned with the functions of animals. The term function is used to mean the characteristic actions performed by an animal or by its constituent parts; thus the ear is concerned with the function of hearing. Physiology is the province of the physician; anatomy that of the surgeon.

The study of even the simplest forms of animal life throws light on the functions of those higher in the scale of evolution, since certain characteristic functions are displayed by all animals. They possess the power to take in food, build this up into their own substance, and reject the waste products formed during this process. The power to grow in size represents one aspect of this function. They are able to reproduce themselves, thereby giving rise to other animals. Finally, they are influenced by changes in their surroundings, which act as stimuli to which they can respond by some alteration within themselves.

The simplest form of animal life consists of a single cell. This is a tiny particle of living material, semi-fluid in consistency, and called protoplasm. Part of this little mass of protoplasm differs from the remainder in appearance and chemical nature, and is known as the nucleus. Chemical analysis of such an organism reveals nothing in its composition which may not occur in dead matter; not by its composition or even its structure, but by its power to move, nourish, and to reproduce itself, do we recognize an animal to be alive.

The physiologist finds that living organisms possess two characteristic properties, upon the possession of which depends their ability to carry out their functions. The first is that the living animal is constantly undergoing change; every day part of its protoplasm is destroyed and is replaced by the building up of new protoplasm. The second is that the animal has the power to store up energy in its body, and to expend part of this energy from time to time.

If, however, the animal is to renew its protoplasm and to store up energy, it must be supplied with food. This, after undergoing a preliminary process of digestion, furnishes the raw material which the living animal transmutes into

living protoplasm, or can utilise as a source of the energy expended in the course of its activities. The processes involved in the building up of food into protoplasm and the breaking down of protoplasm into waste products are included under the term metabolism.

In the lowest forms of animal life all the processes just described take place within the compass of a single cell. But the study of animals higher in the scale of evolution at once reveals differentiation of both structure and function, since these animals consist of many cells, which have become modified in structure and specialised as regards their function. Some cells are gathered together to form organs, possessing the special function of forming the digestive juices and of carrying out the digestion of the food taken into the body. Other groups of cells are transformed into muscles, and are concerned in bringing about bodily movements. Other cells, again, form organs, such as the eye.

An outcome of increasing complexity of structure and specialisation of function in the higher animals is that, as regards their functions, the different organs fall into two main groups. One group is primarily concerned with providing for the nutritive requirements of the body, the supply of oxygen, and the removal of waste products. The other group is responsible for bringing about the reactions of an animal to changes in its surroundings. All higher animals are provided with muscles and these possess the power of altering their shape, thereby bringing about movement of part or the whole of the body; and such movements form the only means by which an animal or man can enter into communication with the outer world.

In the normal animal, however, every muscular movement is controlled by the central nervous system, which consists of the brain and spinal cord; and these are connected with the muscles by delicate threads called nerves. Hence every movement of the body is normally dependent on, and is an indication of, the activity of the brain or spinal cord. If the nerves passing from the nervous system to any particular muscle are destroyed, that muscle becomes useless and is said to be paralysed. The range and variety of movements which an animal can carry out are proportional to the development of its muscular and nervous systems. The brain is connected

by nerves with the surface of the body, with the eye, and with the ear; a ray of light falling into the eye, or an object touching the skin, causes an impulse to pass to the brain, which may respond to this stimulus by setting in action certain muscles.

The student of physiology must proceed along three main lines of inquiry. He must discover as accurately as possible the functions of each organ of the body and the conditions under which these functions are carried out. He must study how the animal reacts to the changes constantly taking place in its surroundings. Lastly, he must ascertain how the activities of the different organs of the body are linked together and co-ordinated so as to promote the highest efficiency of the body as a whole. In the animal world, structure and function go hand in hand; if a similar structure or organ is found in two types of animals, the main function of that organ will be the same in the two animals. The study of the functions of lower animals, therefore, throws light on the functions of the human body. *Consult Applied Physiology, S. Wright, 1940.*

Physiotherapy. Treatment of the human body by physical means. The operator is called the physiotherapist. Forms of physiotherapy include:

(1) Massage, in which the hands of the physiotherapist are used; the main groups of massage are effleurage, pétrissage, tapotement, frictions, and stroking.

(2) Electrotherapy, in which two types of current may be used. Low tension currents, derived from batteries or mains, are named galvanic, faradic, and sinusoidal for therapeutic purposes. They stimulate nerves and produce chemical and biological effects. High tension currents are derived from the mains and passed through step-up transformers. An oscillating system makes the wave frequency so rapid that nerve stimulation and chemical effects cease to take place and the main result is the heating of bones and organs. These currents are known as diathermy or short-wave currents.

(3) Ray therapy, in which electrical currents heat suitable electrodes or filaments or are used to strike arcs to produce the electromagnetic waves of the radiant heat, infra-red, and ultra-violet ray treatments. The first-named rays penetrate to varying depths in the tissues and on absorption cause a rise in temperature of the

irradiated part; the last penetrate only the superficial layers of the skin to bring about chemical change.

(4) Exercise therapy comprises movements by the patients themselves with their own bones, joints, and muscles, often with the help or resistance of the physiotherapist or some apparatus—bars, stools, slings, pulleys, etc. There is one exception, *i.e.* the passive movement, performed by the physiotherapist moving a part of the patient which he cannot or must not move.

Games may be adapted to suit a patient at all stages of recovery and provide a variation of exercise therapy.

(5) Hydrotherapy implies that water is used. It may be applied in small bowls or baths, through sprays and douches or in pools. It eliminates the action of gravity and is used in cases of muscular weakness, joint stiffness, etc. Spa waters are also utilised.

Many of these methods can be used as a preventive, *e.g.* to train a patient before operation in chest, abdominal, or limb movements, and so avoid complications such as collapse of lung, or stiff joints; also in training for childbirth and after labour, to fit the mother to resume normal duties with a good posture, and prevent the occurrence of flat foot, varicose veins, or backache. Physiotherapy is used in *e.g.* infantile paralysis, cerebral palsy, lung operations, abdominal operations, removal of the knee cartilage, dislocations, fractures, sprains, ruptured muscles and tendons, heart diseases, gynaecological operations, flat feet, knock knees, bow legs, anaemia, war injuries, amputations.

Training schools are found in nearly all the large teaching hospitals in London, also in Manchester, Liverpool, Birmingham, Leeds, Newcastle-upon-Tyne, Bristol, Cardiff, Edinburgh, Glasgow, and Dublin. Students take examinations of the Chartered Society of Physiotherapy, the register of which in 1948 contained some 16,000 names.

Physostigmine or **ESERINE**. Substance obtained from the calabar bean (*Physostigma venenosum*) and used for various affections of the eye, *e.g.* to contract the pupil.

Piacenza. Prov. of N. Italy, in Emilia. It lies S. of Milan, E. of Pavia, and W. of Parma. The surface is level in the N. and mountainous in the S. *Pron. Pee-ahen-tsa.*

Piacenza. City of Italy, the ancient Placentia. The capital of the prov. of the same name, it stands on the right bank of the river Po, just below the influx of the Trebbia, and is a junction 92 m. by rly. N.W. of Bologna and 36 m. W.N.W. of Parma. It contains the 13th century Palazzo Comunale, the Palazzi dei Tribunali, and degli Scotti, early Renaissance brick and terra-cotta buildings; the Palazzo Governo, with a famous sundial; the Palazzo Farnese, a huge structure begun in 1558, but unfinished and now used as a barracks; and two episcopal palaces.

The cathedral, dating from 1122-1233, has a handsome belfry. The church of S. Antonino, the original cathedral, was founded in the 4th century, restored in 903, rebuilt in 1104, and altered in 1857. The church of Santa Maria is decorated with mural paintings, while that of San Sisto (1499) formerly held and gave its name to Raphael's Sistine Madonna. The city is walled, and in the Piazza dei Cavalli, the principal square, are two equestrian statues—of dukes Alessandro and Ranuccio Farnese. Manufactures include iron, brass, silk and cotton goods, hats, and pottery; printing and flour-milling are also carried on.

Colonised by Rome in 218 B.C., Placentia was captured by the Gauls in 200 B.C., and by Totila in A.D. 546. In the 12th century it became a leader in the Lombard League. It has several times fallen to the French, and in the vicinity, in 1746, the Austrians gained a decisive victory over the French and Spaniards. The modern history of Piacenza has been closely connected with that of Parma, being merged into the kingdom of Italy in 1860. Entered April 27, 1945, by the Allies without serious German opposition, it suffered scattered but no important damage during the Second Great War. Pop. 79,670. See Parma.

Pia Mater. Middle membrane of the three which surround the brain. It is prolonged downwards to cover the spinal cord. See Brain.

Piana dei Greci. Town of Sicily, in the prov. of Palermo. Situated at the foot of the hill, 11 m. S.W. of Palermo, it was founded in 1488 by Albanian emigrants who fled from the Turks, and whose language and customs survive. Silk and woollen goods are manufactured. Pop. 8,500.

Piankhi. Name of several Ethiopian kings of Napata (*q.v.*). Piankhi I, c. 743-714 B.C., is best

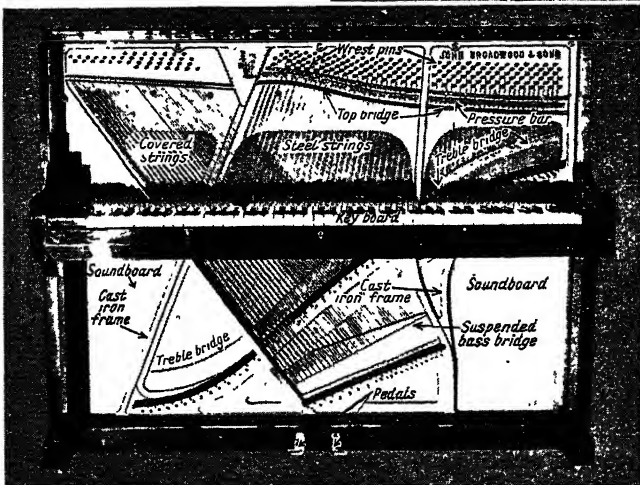
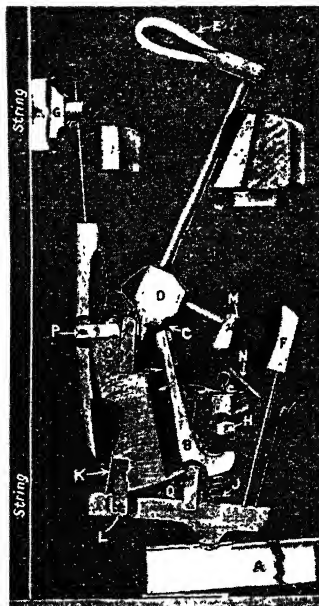
known by his inscribed granite stela, 5 ft. 9 ins. high, erected at Gebel Barkal, near Napata, and now in Cairo. It contains a picturesque account, in 159 lines, of his victorious expedition in a great flotilla down the Nile, which resulted in his conquest of Egypt.

Piano. Italian term used in music to indicate that the performance is to be soft. The term pianissimo is used for very soft. The abbreviations, *p*, *pp*, and *ppp* are more commonly used than the full words. Old music has *pia.* for piano. Pron. pee-ah-no.

Pianoforte (It., soft-loud). Musical instrument. The pianoforte, the name of which is now customarily shortened to piano, is a percussion instrument descended from the dulcimer family. The tone is produced by the impact of felt hammers upon wires or strings of varying gauge, length, and tension. In the lowest part of the compass, for about two octaves, the required gravity is obtained by covered, or wound-round, strings, one or two to each note; above this are three uncovered strings to each note.

The instrument is played from a keyboard composed of a recurring series of long (white) and short (black) levers or keys, seven of the former and five of the latter in each octave, the black notes being in alternate groups of twos and threes, separated by white ones. These, on being depressed by the fingers, set in motion a complicated mechanism (action) designed not only to propel the

hammers against the strings, but further to respond to the player's will, by means of his touch, in the way of graduated tone, and perfect repetition. The action is further complicated by the necessity for dampers to check undesired vibrations when the finger releases the key. The illustration shows the mechanism of the action for treble notes. When the key A is depressed the whole carriage is moved on its centre at L. This movement is transmitted through



Pianoforte. Interior of a barless frame instrument. Top, right, diagram illustrating action. A. Key. B. Jack. C. Notch. D. Hammer butt. E. Hammer head. F. Check. G. Damper. H. Set-off button. J. Jack or hopper spring. K. Spoon. L. Carriage centre. M. Check tail. N. Tape. O. Hammer butt centre. P. Damper lever centre. Q. Jack centre. See text.

By courtesy of John Broadwood & Sons, Ltd.

the jack B which comes in contact with the hammer butt D at the notch C. The set and shape of this notch is the most vital part of the action. The hammer head E is carried forward to strike the string. The set-off button H now comes into play by throwing the jack B from under the notch, thus preventing the hammer head blocking on the string. The hammer being thrown back from the string, the check tail M is caught by the check F, and so held until the key is released. In the upward movement of the carriage the spoon K comes into action by raising the damper G. The carriage and hammer butt are connected by tape N. J is the jack or hopper spring, O the hammer butt centre, P damper lever centre, Q jack centre.

There are usually two pedals; the one on the right suspends the whole damper action when pressed down. That on the left acts in one of three ways: (a) By shifting the action so that the hammers strike only two of the three strings, the unstruck one vibrating in sympathy and thus imparting a somewhat veiled but beautiful change of tone colour; (b) by moving the hammers closer to the strings so as to strike them with less force; and (c) by interposing a strip of felt between the hammers and the strings. The last two are applied to upright instruments and have little to recommend them. In certain cases a third pedal is added by which the performer can sustain a desired note or notes without affecting the right pedal.

In most modern pianos the compass is seven and a quarter octaves, from nearly two octaves below the bass staff to two octaves and a musical fifth above the treble staff. Modern pianos are of two kinds, grands and uprights, the overall dimensions varying with the string lengths employed.

Although the idea of an instrument which should remedy the deficiencies of the inexpressive harpsichord seems to have been working in more than one mind at the beginning of the 18th century, the credit for priority of invention is now generally allowed to Bartolommeo Cristofori (1651-1731), a harpsichord maker of Padua and, later, of Florence. Schroeter in Germany, and Marius in France, were but little later. Subsequent makers have effected numerous improvements, but in all essentials the modern grand is simply a development of Cristofori's *Clavicembalo col piano e forte*. The

light touch and small tone of the older instruments have disappeared, and there is instead a fuller yet wonderfully responsive touch, occasioned by improved action necessary to obtain good tone from much heavier strings, with the result that a concert grand is almost organ-like in its amplitude of sound. To the average player the piano is the instrument offering the maximum of return for the minimum of outlay, enabling him to acquire a personal acquaintance with various forms of music. Small wonder that it has become a household instrument, especially in its upright and "cottage" (small upright) forms, which take less space than the grand. A very large and important trade is the consequence. There is a vast demand for piano music, both original and arranged. This state of things could never have been had the harpsichord retained its supremacy. Cristofori's invention, therefore, may be regarded as one of the chief factors in spreading a wider knowledge of music among the people. See Music; Organ; Player Piano. Consult History of the Piano, E. Closson, Eng. trans. D. Ames, 1947.

Piano-organ. Mechanical musical instrument. Shaped like an upright pianoforte, it is controlled like the barrel-organ, with which it is often confused, by a revolving cylinder and turned by a hand-crank, with pins in suitable position to come in contact with actuating levers. But whereas in the barrel-organ the lovers admit wind to pipes or reeds, in the piano-organ they strike upon strings. The instrument was a favourite with street musicians in the late 19th and early 20th centuries, musical hall songs and operatic arias being rendered in a flat mechanical tinkling tone relieved by an abundance of trills and flourishes.

Piassaba. Fibre largely used for making brushes and brooms. It is obtained from two S. American palms, of the family *Palmae*. The finer kind, known as *Para piassaba*, is the envelope of the young leaves of *Leopoldinia (Cocos) piassaba*, which after it has served its natural purpose hangs down and covers the trunk. The other and coarser kind comes from the leaf bases of *Attalea funifera*, the fruits of which (coquilla nuts) are extensively used by the turner for making knobs and small articles.

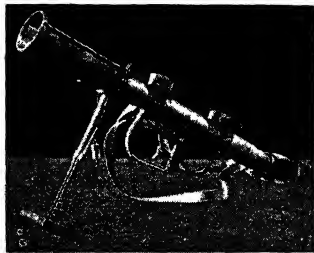
Piastre. Name of a Turkish and an Egyptian coin, each being of nickel. According to the country in which they are used,

100 piastres are worth £1 Turkish and £1 Egyptian, but the value of Turkish currency in exchange with sterling was, for some time after the Second Great War, undecided.



Piastre. Obverse and reverse of the Turkish coin. Actual size

P.I.A.T. (PROJECTOR, INFANTRY, ANTI-TANK). Weapon introduced in the British army in 1943. The invention of Brigadier M. R. Jeffries, of the ministry of Supply, it weighed 33 lb., and fired a 2½-lb. bomb with a hollow charge which could penetrate 4 ins. of armour. Fired from the shoulder, its controlled recoil and padded shoulder-piece made it suitable for operation by one man, with a second as loader. It could stop tanks at 115 yds., and was extremely effective against concrete emplacements.



P.I.A.T. British anti-tank weapon introduced during the Second Great War

Piatra. Town of Moldavia, Rumania. It is about 60 m. S.W. of Jassy, and trades in timber. Pop. est. 30,000.

Piahy or PIAUI. State of N.E. Brazil. It is bounded W. by Maranhão, E. by Ceara and Pernambuco, and S. by Bahia. The river Parahyba flows along its W. boundary. The surface is mostly a plain, watered by numerous rivers, and stock-raising is the principal industry. Iron, copper, silver, lead, and salt are found, but are little exploited. Cotton, sugar, tobacco, rice, rubber, and dye woods are produced, and cotton-weaving is carried on. The capital is Therezina (q.v.). The area is 116,494 sq. m. Pop. 832,250.

Piave. River of N.E. Italy. It rises in the Carnic Alps and flows in a S.E. direction to the Adriatic 22 m. N.E. of Venice, after a course of 125 m. At its mouth is Porto di Cortellazzo; its old mouth was at Porto di Piave Vecchia, nearer Venice. Pron. Pee-ahvav.

Piave, BATTLES OF THE. Three battles of the First Great War, fought between Austrian and Italian armies in Nov., 1917, June, 1918, and Oct.-Nov., 1918. The Italians were aided by British forces, the Austrians by German. After their disaster at Caporetto (*q.v.*), Oct., 1917, the Italians took up positions on the W. bank of the Piave. The lower Piave between the Montello and the Adriatic Sea formed a fair defensive front, but to the N. of the Montello the river presents no natural obstacle. The battles of Nov. revolved round attempts made by the Austro-Germans to cross the river at various points. They were successful at only one point, near Zenson on the Lower Piave, though once across they remained pinned against the W. bank until they lost the position in Jan., 1918.

In the Austrian offensive of June, 1918, the main weight of the attack was felt on the line of the Lower Piave. A few crossings were achieved near Neuresa, but little ground was gained in the face of Italian resistance, except in the marshy region nearest the sea. But on June 19 the Piave poured down in flood, and the Austrians were forced back to the E. bank with heavy losses. In short, their offensive failed on the Piave as elsewhere, and the end of June found the Italians re-established solidly along the W. bank.

The third battle was opened Oct. 27, 1918, by Italian and British forces (including one U.S. regiment), the British consisting of the 7th and 23rd divisions. They crossed the Piave N. and S. of the Montello, and pressing the attack had the Austrians in retreat throughout the following days, capturing 50,000 prisoners. By Nov. 3, they had crossed the Tagliamento, representing an advance of some 30 m. along the whole line; and the advance was only brought to a halt with the cessation of hostilities by the granting of the armistice of Nov. 4.

Piazza (Lat. *platea*, broad space). Italian word for a square or open space, surrounded by buildings. The most famous is the piazza of S. Mark at Venice. Some of these squares were surrounded by an arcade, and the word is therefore sometimes used for an arcaded walk. *See* Venice.

Piazza Armerina. City of Sicily, in the prov. of Enna. On a mountain slope, alt. 2,360 ft., 15 m. E.S.E. of Caltanissetta, it has a 16th century cathedral with a fine belfry, and remains of the Norman

period. The inhabitants of Piazza, which was founded in the 11th century, still speak a Lombard dialect. There is a trade in oil, wine, and nuts. Pop. 38,500.

Piazzi, GIUSEPPE (1746-1826). Italian astronomer, born at Ponte in the Val Tellina, July 16, 1746. He became professor of mathematics at Palermo, 1781, and established there an astronomical observatory. After publishing in 1792 corrections of previous estimates of the aberration of light, the parallax of certain heavenly bodies, etc., on Jan. 1, 1801, he discovered the first asteroid (*q.v.*), Ceres. For his two catalogues of fixed stars, in 1803 and 1804, he received recognition by the French Institute. Appointed director of the govt. observatory at Naples in 1817, he died July 22, 1826.

Pibcorn (Gael. *piob*, pipe; *corn*, horn) or **HORNPIPE**. Ancient reed instrument mainly in use among Celtic peoples. It probably gave its name to the familiar dance now associated with sailors.

Pibroch (Gael. *piobaireachd*, art of piping). Music of the Scottish Highlands, suitable for the bagpipes. In form it is of the variation type, an air being given out and then varied by ornamental treatment of all kinds. The variations usually increase in elaboration, sometimes alternating with a slow version. Many pibrochs bear the names of famous pipers or their chieftains, or of legendary stories or events of history. *See* Bagpipe.

Pica. A printing type. Also known as 12-point, it is a size larger than small pica, a size smaller than English, and the largest ordinary size of book type: six lines make an inch in depth.

This line is in pica.

Used as a standard unit of measurement, and also for the point system, it is called *Le Cicéro* in French and *Cicero* in German, the Epistles of the Latin writer of that name having been first printed in type of this size. The Dutch call it *Mediaan*. *See* Printing.

Picardy. One of the provs. into which France was divided before the Revolution. It lay between Normandy, Île de France, Champagne, Hainault, and Artois, and had a frontier on the English Channel. Through it ran the rivers Somme and Oise, and it was divided into N. Picardy and S. Picardy. In it were the cities of Amiens, Laon, Beauvais, Senlis, Soissons and Noyon; also Boulogne and St. Quentin. The name

Picardy appeared about 1300, but much earlier the district had been a possession of the kings of France. Part of it was handed over to the duke of Burgundy in 1435, but this was recovered by the French king in 1477. It was long a prosperous district—a French East Anglia—while the Picard also had a reputation as a fighting man. Today Picardy is represented by the department of Somme, and parts of those of Pas-de-Calais, Aisne, and Oise, in all of which intense fighting took place in the First Great War. *See* Amiens.

Picaresque Novel. Type of story dealing with the lives and doings of rogues and adventurers. The adjective is derived from the Spanish word *picaron*, Eng. *picaroon*, a cheat, an adventurer, or one who lives by his wits. Due to reaction against the degenerate romance of chivalry; the type originated about 1550 with the anonymous Spanish Life of Lazarillo de Tormes, the realistic description of the career of a young beggar. It was followed by Alemán's *Guzmán de Alfarache*, 1599, and by many similar novels in Spain and other countries. Examples are Le Sage's *Gil Blas*; Fielding's *Jonathan Wild*; and Thackeray's *Barry Lyndon*.

Picasso, PABLO RUIZ (b. 1881). Spanish painter. Son of Basque parents, Pablo Ruiz was born at



Pablo Picasso,
Spanish painter

Malaga, Oct. 23, 1881. He later adopted his mother's maiden name as his surname. After some time in Barcelona, where his father was professor at a academy of

arts, he worked at the École des Beaux-Arts, Madrid, and from 1903 made his home in Paris.

His work can be divided into several phases: the realistic period, 1895-1901, influenced by Degas and Toulouse-Lautrec and marked by fine draughtsmanship; the blue period, 1901-04, rendering in melancholy manner harlequins, circus dancers, and pierrots with almost monochromatic colour; the rose period, 1905-06, reminiscent of Cézanne and Van Gogh; the negro period, 1907-08, when he was preoccupied with Fauvist doctrines. In 1909 he began to work with Braque and launched his Cubist formulae—a phase which, lasting until 1914, had a far-reaching influence on painting.

Picasso joined Diaghilev and his Russian ballet in Rome about 1917; he designed the décors of *The Three Corners*, *Hat*, *Pulcinella*, and other ballets. After the First Great War he returned to more classical painting, and many canvases dating from the 1920s were on a gigantic scale. His paintings shortly before and after the Second Great War deepened in harshness and violence, the outcome of his *Guernica*, painted during the Spanish Civil War. After 1945 he turned to a naturalism of great power. His illustrations for Buffon's *Histoire Naturelle*, 1942, were a series of 31 aquatints. Picasso was a supreme innovator, the originator and leader of almost all new departures in painting from 1910. He is represented at the leading European galleries, and at the Museum of Modern Art, New York. The *Château Grimaldi*, near Vallauris, S. France, became a Picasso museum in 1949. *See* Art illus., p. 604; Cubism illus.; Drawing illus. *Consult* works on his art by A. Salmon, 1920; M. Raynal, 1921; G. Stein, 1938; P. Eluard, 1947.

Terence Dennis

Picayune (prob. Fr. *picailon*, a small coin). Name used in Florida and Louisiana for the Spanish half-real, and later for the U.S. 5-cent piece.

Piccadilly. London thoroughfare. It extends W. from Coventry Street and Piccadilly Circus to Hyde Park Corner. One of the fashionable parts of the metropolis, and with a history going back to the early part of the 17th century, it contains the Piccadilly, Ritz,

and other hotels, Burlington House (*q.v.*), Burlington Arcade, and many clubs. Some of the houses for which it was famous still front the Green Park. Devonshire House was pulled down in 1921, but Apsley House (*q.v.*) remains, as does Albany, designed for Lord Melbourne and since 1804 devoted to residential chambers in which Byron, Macaulay, Canning, Bulwer Lytton, Gladstone, Arnold Bennett, and J. B. Priestley resided. In S. James's Church, built by Sir Christopher Wren in 1682-84, and almost destroyed during the Second Great War, Charles Cotton, Tom D'Urfey, and Mark Akenside were buried. In its grounds was laid out a garden of remembrance designed by A. E. Richardson, and opened by Queen Mary, May 12, 1946. The 4th duke of Queensberry, known as "Old Q," lived at No. 138. At No. 145 King George VI resided as duke of York from 1927 to his accession in 1936.

St. James's Hall, once the home of the Moore and Burgess Minstrels, stood on the site of the Piccadilly Hotel. Piccadilly Circus is crossed by Regent Street, while Shaftesbury Avenue, Coventry Street, and Glasshouse Street lead from it. It contains the Criterion Theatre and Restaurant and the London Pavilion, and in the centre is a fountain by Alfred Gilbert, erected in 1893 to the memory of the 7th earl of Shaftesbury (*see* Eros). Piccadilly derives its name from a house built by a retired tailor on the N.W. corner of the Haymarket, and called Piccadilly Hall because its owner had made

foppish doublet trimmings and collars known as peccadils or peckadils. The name Piccadilly is also given to a thoroughfare connecting Market Street and London Road, Manchester. *Consult* Piccadilly, Laurence Oliphant, 1870; *The Ghosts of Piccadilly*, G. S. Street, 1907; *Wanderings in Piccadilly*, Mayfair, and Pall Mall, E. B. Chancellor, 1908; *Piccadilly in Three Centuries*, A. I. Dament, 1920.

Piccadilly Line. Branch of the London underground rly. Opened as the Great Northern, Brompton, and Piccadilly Tube rly., Dec. 15, 1906, it ran from Hammersmith to Finsbury Park. An extension from Holborn to the Strand was added the next year. In 1932 the line was extended from Finsbury Park to Arncliffe Grove; Oct. 23, 1933, a through service was inaugurated between Uxbridge and Cockfosters. By 1947 the line covered 37.81 miles, and had 49 stations.

Piccadilly Theatre. London playhouse in Denman St., W.1. It was opened April 27, 1928, under the management of Edward Laurillard. It seats 1,160.

Piccard, AUGUST (b. 1884). Swiss physicist. Born at Geneva, he was educated at Zürich high



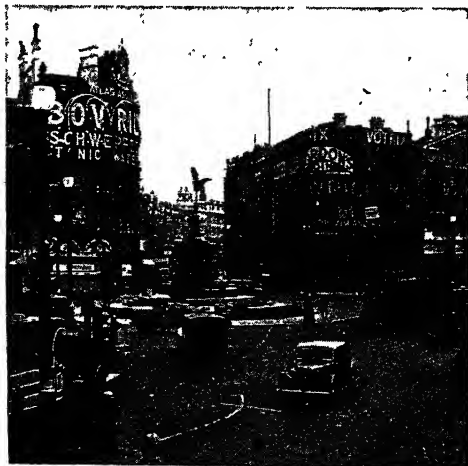
August Piccard,
Swiss physicist

school and Basel university, and in 1925 became professor of physics at Brussels. He specialised in the study of cosmic radiation, and constructed a balloon and

air-tight gondola in which in 1931 he made an ascent into the stratosphere, reaching the then unprecedented height of 51,458 ft. (9.7 m.). On Aug. 17, 1932, he achieved an altitude of approximately 10½ m. In 1945 he turned his attention to the disintegration of sunlight at ocean depths, and in 1947 built a submarine "bathyscaphe," which proved unequal to his intended descent of 2½ m. in the Gulf of Guinea. *See* Stratosphere.

Piccolo. Italian word meaning small, most commonly applied to the little flute which sounds an octave higher than the concert flute. Some piccolos are made a semitone, or a tone and a half, higher than the ordinary piccolo, with open scales sounding E flat and F respectively. The compass of the piccolo is similar to that of the flute, but sounding an octave higher than the flute of the same nominal pitch. The piccolo, however, does not possess the lowest two semitones (C and C sharp), and reaches the extreme upper notes only with shrillness and difficulty. *See* Flute.

Piccolomini. Name of a noble Italian family. Settling in Siena in the early 13th century, its members established commercial houses in Italy, France, and Germany,



Piccadilly, London. View of Piccadilly Circus from Piccadilly, looking up Shaftesbury Avenue, and showing Gilbert's Shaftesbury memorial fountain in the centre surmounted by the Eros statue

and amassed great wealth. Belonging to the Guelph faction, they were alternately in exile and in power, but eventually lost their influence and declined in prosperity. The family produced several important personages, including two popes, Aeneas Silvius, Pius II (*q.v.*), and Francesco, Pius III (1439–1503). Alessandro Piccolomini (1508–78), archbishop of Patras, was a philosopher.

Piccolomini, OTTAVIO (1599–1656). Italian soldier. Born in Florence, Nov. 11, 1599, he belonged to the noble family of which Pius II was a member. He began his military career in the army of Spain, but in 1618, on the outbreak of the Thirty Years War, was with a force sent to fight on the emperor's side. He had a full and varied career both as a diplomatist and soldier before he joined Wallenstein, and, having fought at Lützen, he rose to be a general officer, and shared in the plot that resulted in the murder of his leader. In 1635, having in 1634 helped to win the battle of Nördlingen, he went to aid the Spaniards in the Netherlands, and he remained in high command until the end of the war in 1648, being in its concluding months the imperial generalissimo. He was made duke of Amalfi and a prince. He died Aug. 11, 1656. Piccolomini figures in Schiller's *Wallenstein*.

Pice. Copper coin of India and Pakistan. Four equal one anna (*q.v.*), and the value of one is a farthing. It is divided into three pie.

Picenum. Country of ancient Italy. Lying on the Adriatic, it was bounded N. by Umbria, W. by Umbria and the Sabine country, and S. by the country of the Vestini. The inhabitants of Picenum submitted to Roman rule towards the middle of the third century B.C., but revolted in the Social War, 90 B.C., their town of Asculum being made the capital of the league. Later they secured the Roman franchise.

Pichegru, CHARLES (1761–1804). French soldier. He was born at Arbois, Feb. 16, 1761, and educated

at the military academy of Brienne, to which he subsequently returned as a teacher, among his pupils being Napoleon. In 1793 he became a divisional general in the

Revolutionary army, and in the next two years acquired a great military reputation by his series of victories over the Austrians and their allies. In 1795, however, he began a series of intrigues with the Bourbons, which led eventually to his deportation to the penal colony of Cayenne. Escaping to England, in 1798 he resumed his intrigues, and, with Cadoudal as ringleader, a plot was hatched for the assassination of Napoleon. Cadoudal and Pichegru made a secret visit to Paris, but Pichegru was betrayed and arrested, and on April 15, 1804, was found strangled in his bed.

Pichincha. Prov. and volcano of N. Ecuador. The prov. is S. of Imbabura, E. of Manabi, and N. of Leon. It has many fertile valleys, but is subject to earthquakes. The capital is Quito. Pop. 303,480. The volcano is 8 m. N.W. of Quito, and has an alt. of 15,919 ft., with a crater 2,500 ft. deep. On its slopes was fought, May 22, 1822, the battle which secured the independence of Ecuador.

Pickerel. Name used in the U.S.A. and Canada for small fish elsewhere called pike (*q.v.*).

Pickering. Urban dist. and market town in N. Riding of Yorkshire, England. It is 32 m. by rly. N.E. of York. The chief building is the church of S. Peter, which contains some old mural paintings discovered in 1851, and restored; a Norman font, and some other Norman work. There are ruins of a castle, which existed before the Norman Conquest and was afterwards in the duchy of Lancaster. The chief industry is the manufacture of agricultural implements, and there is a trade in agricultural produce. The vale of Pickering lies between the moors of N. Yorkshire and the Wolds. Market day, Mon. Pop. 3,668.

Pickering, EDWARD CHARLES (1846–1919). American astronomer. Born at Boston, July 19, 1846, he was educated at the Lawrence Scientific School, Harvard. He became Thayer professor of physics, 1867–76, at the Massachusetts Institute of Technology, and professor of astronomy and director of the observatory at Harvard, 1876, a post he held to his death. In 1906 he became pre-

sident of the Astronomical and Astrophysical Society of America. He died Feb. 3, 1919. Pickering made a special study of the light and spectra of stars, in connexion with which he invented the meridian photometer.

Pickering, WILLIAM HENRY (1858–1935). An American astronomer. Born in Boston, brother of E. C. Pickering, he was assistant instructor of physics at the Massachusetts Institute of Technology, 1880–87, and became assistant professor of astronomy at Harvard, 1887. Pickering became famous by his discovery of Phoebe, the faint ninth satellite of Saturn, and in 1921 put forward the theory that there is vegetable life on the moon. He died in Jan., 1935.

Picket. Military term signifying a small detachment of troops used as an outpost or guard. It may also mean a body of troops detailed for certain special eventual duties—the fire-picket being the men instructed to take immediate action in an outbreak of fire.

Picket Boat. Small boat, usually a steam pinnace, carried by warships. See Boat.

Picketing. Term borrowed from the military word picket, and used to describe the practice, common during strikes, of placing men to restrain others from work-



Pickering, Yorkshire, N.R. Main Street, and the spire of the parish church of S. Peter

ing, or to obtain or impart information bearing on the dispute. The Conspiracy and Protection of Property Act, 1875, made it unlawful not only to use violence or intimidation, but also to "watch or beset" the house or place of work of another person with a view to compelling him to abstain from work. The Trade Disputes Act, 1906, clarified the position, making picketing lawful for the purpose of peacefully obtaining information, or of peacefully persuading any person to work or to abstain from working.

Following the general strike of 1926, the Trade Dispute and Trade



Charles Pichegru, French soldier

Unions Act, 1927, was passed, which imposed criminal liability on persons engaged in picketing in a manner liable to intimidate any persons or to cause a breach of the peace. This legislation was repealed in 1946. *See* Osborne Case; Strikes; Trade Disputes Act; Trade Unions.

Pickford, MARY (b. 1893). Canadian film actress. Gladys Mary Smith was born in Toronto April 8, 1893, and was a child actress in East Lynne and Uncle Tom's Cabin—suitable training-grounds for her talents in the unsophisticated films in which she later made her name.



Mary Pickford,
Canadian film actress

In 1912 she joined the Biograph Co., and under the direction of D. W. Griffith appeared in *The Violin Maker of Cremona*. She then played in *Hearts Adrift*, and achieved fame in innumerable short films with a "Wild West" background. With her curls and gingham dresses, and her air of schoolgirl innocence, she was known to millions as "the world's sweetheart." Her best-known films included *Tess* of the Storm Country, *Stella Maris*, *Rebecca of Sunnybrook Farm*, *Daddy Long-Legs*, *Pollyanna*, *Little Lord Fauntleroy*, and *Dorothy Vernon of Haddon Hall*. Her appearances in talking pictures, including *The Taming of the Shrew*, were less successful.

Mary Pickford became head of her own film company at Hollywood, and organized the Pickford-Lasky productions. She published *Why Not Try God?* 1934, and *My Rendezvous with Life*, 1935.

She married 1, Owen Moore; 2, Douglas Fairbanks; 3, Charles (Buddy) Rogers.

Picking. Term applied in metallurgy and mining to one of the preliminary processes by which worthless gangue is separated from valuable ore. The operation consists simply in turning over the mass of crude ore, breaking the larger pieces which is in many cases done by hand, examining carefully the pieces, and picking out and throwing aside those which are obviously of no value. The picking may be performed on the mass in the open as in many metalliferous mines, or it may be performed at the side of a travelling band which carries the crude material along past the pickers as

is done at many modern collieries. *See* Coal; Ores; Mining.

Pickles (Dutch *pekkel*, brine). Articles of food preserved in brine or vinegar. Pickled vegetables and pickled meats formed an important part of the diet of our ancestors, when meat was killed at Michaelmas for the winter and winter vegetables were few. Dry salting in barrels is extensively practised in Holland and Belgium, but not to a large extent in England. Another method is by pickling in strong brine.

Certain kinds of pickles used as appetisers are prepared in a solution of salt or brine, especially olives, capers, and walnuts. Sauerkraut is made by steeping finely shredded white cabbage in a solution of this kind. Other pickles are made by pouring boiling vinegar over the vegetable used, and allowing it to simmer for a short time. Cucumbers, gherkins, green tomatoes, onions, small peppers, beets, and cauliflower are prepared in this way.

Various seasonings, salt, sugar, spices, and occasionally mustard, are added to the vinegar. Most pickles require to be kept for a short time before using.

Pickle the Spy. Name popularly given to Aleslair Ruadh Macdonnell of Glengarry (c. 1725-61), the Jacobite. *See* Macdonnell, Aleslair; *consult also* *Pickle the Spy*, 1897, and *Companions of Pickle*, 1898, Andrew Lang

Pickling. Term used in metallurgy for a method for removing the oxidised film and scale from the surfaces of a metal part or specimen by immersing it in a bath of acid or other liquid which will attack and dissolve the oxidised layer. Different acids are used for differing metals and purposes, and, in some cases, the acid may be heated. The time of immersion varies with the material and purpose. The process is commonly used to prepare the surface for (a) the application of a protective coating, (b) welding, (c) mechanical treatment, such as cold rolling or drawing, or (d) to detect any surface flaws which might be invisible to the naked eye, but which would show through increased corrosion attack, by the acid, in the vicinity of the flaw.

Pickthall, MARMADUKE WILLIAM (1875-1936). British author. Born April 7, 1875, he went to Harrow, and spent some years in travelling throughout the Near East, acquiring a close knowledge of native life and languages in

Egypt, Turkey, and Syria, ably displayed in his novels and other writings. These include *Said the Fisherman*, 1903 (probably his best-known work); *The House of Islam*, 1906; *The Children of the Nile*, 1908; *Knights of Araby*, 1917; *Oriental Encounters*, 1918; and *The Early Hours*, 1921. He died May 19, 1936.

Pickwick Papers, THE. Popular name for Charles Dickens's first long work of fiction, a classic of English humour, of which the full title is *The Posthumous Papers of the Pickwick Club*, edited by Boz. First issued in monthly parts, April, 1836-Nov., 1837, it originated in a suggestion that Dickens, then 24 years old, should provide letterpress to accompany a series of sporting plates by Robert Seymour (*q.v.*). Dickens demanded a freer range; and, following Seymour's suicide after the publication of the second part, he assumed full control of the story, the later plates by Phiz being altogether subordinate to the text. From that moment the publication met with extraordinary success, the print order for monthly parts leaping from a few hundred to 40,000. The book has since been reprinted in countless editions in many languages.

Samuel Pickwick, the elderly, benevolent hero, famous for his spectacles and gaiters, together with the pseudo-sportsman Nathaniel Winkle, the poetic Augustus Snodgrass, and the amorous Tracy Tupman—these four are the "corresponding members" of the Pickwick club, and the work is a chronicle of their farcical misadventures in London, Rochester, Bath, Bury St. Edmunds, Ipswich, and elsewhere, including the fictitious Eatanswill (*q.v.*) and Dingley Dell farm. Between 300 and 400 recognizable characters are introduced. The more famous include Alfred Jingle, the unscrupulous strolling player; Ben Allen and Bob Sawyer, the rowdy medical students; Stiggins, the hypocritical "shepherd"; Mrs. Bardell, the landlady who sues Pickwick for breach of promise; and a host of innkeepers, lawyers, servants, and coachmen, as well as casual humbugs and social climbers. Above all, there are Pickwick's faithful and witty cockney manservant, Sam Weller, and his genial father Tony. There is little plot, but a happy ending is ensured for all who deserve it. In writing this book Dickens discovered his power, and the later chapters are noticeably more mature.

Among many dramatic adaptations, mostly necessarily unsuccessful, two were notable, as in one Irving played Jingle, and in the other Charles Laughton played

1895. He wrote a critical study of Velazquez, 1899. He died at Madrid, Nov. 18, 1923.

Picotée (Fr., marked). Horticultural term for a show class of carnations, in which the petals of the flower are edged with a colour contrasting with the ground tint. They are further distinguished as "heavy" and "light" according to the breadth of the edging, which may be in yellow, rose, purple, or red. See *Carnation*.

Picotite. In mineralogy, one of the spinel group of minerals, magnesian variety of chromite (*q.v.*). It is a chrome-spinel containing manganese, aluminium, iron, and chromium, and is found in black grains and crystals in many basic rocks. See *Spinel*.

Picric Acid OR TRINITRO-PHENOL. High explosive known under several names, of which one in the U.K. is

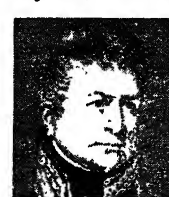
lyddite (*q.v.*). **Picrite**. In geology, a dark, coarsely crystalline igneous rock of ultra-basic composition. It is intermediate between gabbro and peridotite, differing from the latter in that it contains small amounts of feldspar. Usually it occurs as small intrusions or as parts of larger complex igneous rock masses.

Pictography or PICTURE-WRITING (Lat. *pictus*, painted; Gr. *graphein*, to write). Representation of facts and ideas by means of pictorial symbols. The earliest form of self-explanatory record devised by man, it sprang from the primeval arts of design. In palaeolithic Europe naturalistic paintings on cave-walls became conventionalised, and during the Azilian period pictorial symbolism emerged as an aid to memory and a method of communication. Neolithic Egypt and W. Asia carried it to further lengths. In the early metal age pictographic

symbols passed into ideograms, each definitely related to spoken phrase or word. School-exercises in early Sumerian and Egyptian pictographs are extant. These symbols were destined, in Babylonia, Egypt, the Aegean, and China, to develop into syllabic and alphabetic writing.

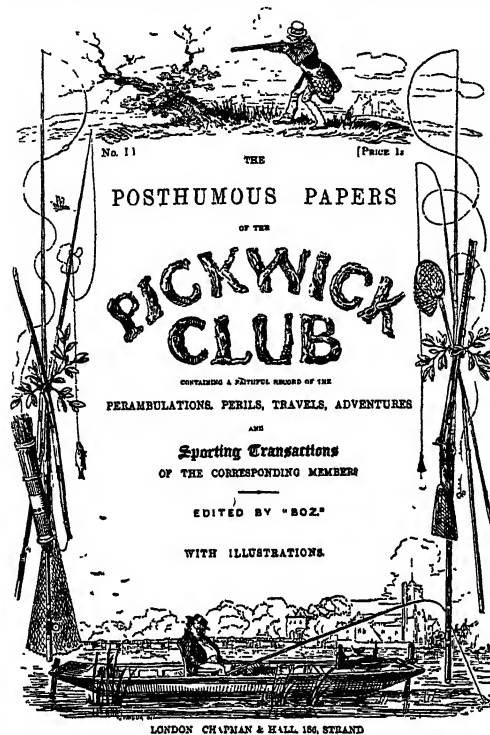
The primitive pictography of the pre-metallic age drifted with early migrations to other parts of the world. In neolithic India it was practised by Vindhya hill cave-dwellers, and is still traceable in Melanesia. At the continental extremities it survives among Bushmen, Veddas, and Australian aborigines. Eskimo bone-engravings, which resemble prehistoric hunting scenes, depict not only concrete objects, but also actions and relations. The symbols are more or less self-explanatory, but are transposed into speech in phrases varying with each interpreter. This form of pictography, conveniently called picture-writing, was highly developed among the N. American Indians, while some Brazilian tribes still inscribe pictorial diaries upon dried calabashes. In pre-Columbian America the Maya and Aztec peoples developed pictographic scripts of true ideographic form, and prepared pictorial codices of considerable skill. This achievement may have had behind it some cultural impulse, remotely derived from the Old World systems. They do not appear to have passed beyond the stage of rebus-writing, for proper names. See *Alphabet*; *Aztec*; *Cuneiform*; *Hieroglyphs*; *Maya*.

Picton, SIR THOMAS (1758-1815). British soldier. Born at Poyston, Pembrokeshire, he entered the army in 1771, and took part in the capture of St. Lucia, 1795, becoming governor of Trinidad, 1797. Resigning in 1803, he was acquitted after trial on charges of using torture. As major, Picton accompanied the Walcheren expedition, 1809. He took part in the Peninsular War at Fuentes d'Onoro, Torres Vedras, Badajoz, Vittoria, and elsewhere. He was killed leading a charge at Waterloo, June 18, 1815.



After Beechey

Picton-Turbervill, EDITH. Contemporary British social worker. Educated at the Royal School,



Pickwick Papers. Seymour's design on the front of the original green wrappers in which the monthly parts were published

Pickwick. John Bunby (*q.v.*) appeared as Pickwick in two early silent films based on the book.

Pico. Island of the Azores, midway between Flores and St. Michael's. It culminates in the volcanic height, Gran Pico, 7,613 ft. Much of the surface is covered with lava. The chief product is wine. San Antonio and Lagens do Pico are the chief towns. Its area is 176 sq. m. Pop. est. 15,000.

Pico della Mirandola, GIOVANNI (1463-94). Full name of the 15th century Italian humanist, Mirandola (*q.v.*).

Picón y Bouchet, JACINTO OCTAVIO (1852-1923). Spanish writer. Born in Madrid, Sept. 8, 1852, he established his reputation as a novelist with *Lazaro*, 1883, a study of ecclesiastical problems, which provoked great controversy. Other shrewd and independent works of fiction included *La Hijastra del Amor*, 1884; *El Enemigo*, 1887; *Dulce y Sabrosa*, 1891; *Cuentos di mi Tiempo*,

Bath, she began her social work by helping to improve the conditions of navvies on the Vale of Glamorgan rly. After spending six years in India, when she was secretary to a student movement, she became vice-president of the Y.W.C.A. She sat as Labour M.P. for Wrekin, 1929-31. Council member of the League of Nations union, and of the women's international league, she successfully introduced a bill to prevent the passing of the death sentence on expectant mothers. She became president of the national council of women citizens in 1944. Her books include *Life is Good* (autobiography), 1939; *In the Land of My Fathers*, 1947.

Pictou. Seaport of Nova Scotia, Canada. It stands on a harbour, an inlet of Northumberland Strait, 118 m. by rly. N.N.E. of Halifax. Industries are fishing, lumbering, and exporting coal. Pop. 3,069.

Picts. Name of a people formerly inhabiting northern Scotland. Divided into two nations, the Northern Picts, or Dicaledonae, inhabited the country between the Pentland Firth and the Grampians; the Southern Picts, Vecturiones or Verturiones, that between the Grampians and the Firth of Forth. The Vecturiones represent the Brythons of the kingdom of Fortrenn.

From the 3rd century A.D. the Picts are recorded as resolute and harassing foes of the Roman occupation, allied sometimes with the Scots, the N. Irish race who peopled Argyll and Kintyre, and they were never definitely subdued by the Romans. S. Ninian and S. Columba were among the missionaries who worked to convert the Picts. Oswald of Northumbria held temporary sway over Pictland in the 7th century, and there were constant wars with the Scots and with the Dalriadic kingdom during the 8th century. The peculiar system of royal succession, by which the rule passed to brothers or the son of a sister, led to much confusion, which ended with the establishment of Kenneth MacAlpin, the Scottish chief from Kintyre, but a Pict by maternal descent, as ruler of Scots and Picts in 844.

Picti, the name used by Latin writers, probably identical with that of the Pictones or Pictavi of Poitou, is held to be a Brythonic (Welsh) designation for this people, who, in fact, called themselves the Cruithni or Cruithnig. There has been much controversy as to who the Picts were, and what their racial stock and language. Skene maintained that names of early Pictish kings were purely Gaelic, though

later ones showed a Brythonic origin, but of Cornish and not Welsh dialect; and it is known that the Damnonii settled both in Cornwall and in Fortrenn (Menteith and the Mearns). Rhys contended that the Picts were non-Aryan, as their custom of matriarchy (*q.v.*) indicates, and brought forward evidence to show that the extant Pictish place-names are of Brythonic and not Gaelic origin.

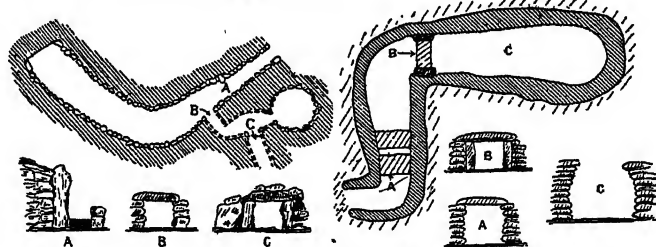
Cruithni means pictured or figured, and the habit of painting the body with figures of birds and beasts was probably widespread. The word Cruithni may well be identified with Brython, Brittones, and Britannia, the Welsh name for Pict being Prydyn. But the question is still obscure, although the old view of the Teutonic (Gothic) stock of the Picts, fostered by Pinkerton and Scott, is abandoned. See Gaelic; Scotland: History; consult *Chronicles of the Picts*, 1867; *Celtic Scotland*, W. F. Skene, 3 vols., 1876-80; *Celtic Researches*, E. W. B. Nicholson, 1904; *Celtic Britain*, J. Rhys, 4th ed. 1908.

Picts' Houses. Name in popular use in Scotland for primitive underground structures of the early metallic age. Their erection is attributed to the Picts, although

innocence remains unimpaired, while his portrait gradually acquires every mark of viciousness.

Picture Post Card. Card sent through the post bearing a printed or photographic picture, which may be a view, portrait, scene, figure, humorous drawing, or reproduction of a painting. Cesare Bertanza, an Italian stationer, introduced the first picture post card in 1865; it carried a view of Lake Garda and enjoyed large sales to tourists. Postcards with views were sold at French shops during the Franco-Prussian war, to soldiers as souvenirs of towns through which they passed.

The first English card, in conjunction with the R.N. exhibition in 1891, bore an outline sketch of Eddystone lighthouse. Commercial cards were sold in 1894 on the summit of Snowdon, a small photograph of which was pasted on them; but these had to bear a penny stamp. In 1895 view cards were published in Great Britain. A great impetus was given to illustrated post cards when in 1898 the official size was increased to 5½ by 3½ ins. In 1904 the left-hand side of the front of post cards was allowed for correspondence hitherto confined to the back.



Picts' Houses. Ground plans and sections of earth-houses. Left, Cairn Conan, Angus; right, near Broomhouse, Berwickshire. In both cases the letters against the sections indicate their positions on the plans

By courtesy of William Blackwood & Sons

they may be of earlier date, and the theory is that they were used as refuges in times of danger. There are several in the Orkneys, but the greatest number are in the western part of Aberdeenshire. They are also found in Angus and other counties N. of the Tay, while there are a few in Berwickshire and other southern counties. See *Earth-house*; *Mousa*.

Picture of Dorian Gray, THE. Novel by Oscar Wilde. It was first published in Lippincott's *Magazine*, 1891. Notable for its scintillating dialogue, it describes the slow corruption of a youth (Dorian Gray) whose appearance of vivid beauty and youthful

The collecting and exchanging of picture post cards attained extraordinary popularity in the first decade of the 20th century, and gave rise to the manufacture of albums, cabinets, etc. A literature sprang up, several magazines being published. The raising of the rate for post cards in the U.K. from ½d. to 1d. in 1918, and in 1921 from 1d. to 1½d., did serious damage to the trade, though cards could still be sent for 1d. if only five words of greeting were written. During the Second Great War the postage rate was raised to 2d.

Pidgin English. Medium of communication in Chinese ports between English-speaking people

and the natives. It is sometimes used as a sort of *lingua franca* even by natives themselves from different districts. Pidgin is a corruption of "business." It is a jargon composed chiefly of English words, although containing an admixture of Chinese, Malay, and Portuguese, corrupted in pronunciation and arranged according to the Chinese idiom. The name is also given to similar jargons in other parts of the world.

Piecework. Term applied to a contract of employment in which remuneration is based on the quantity of work done. In the simplest form of piecework the labour necessary for each "piece" of output is purchased as any other commodity might be. The custom of buying labour by the piece arose in Great Britain in medieval times when middlemen supplied cloth to people working in their own homes, and paid them a fixed rate for making up material. This method of payment is still general with outworkers, i.e. those who work at home on materials supplied to them.

In 1947, in the principal industries of Great Britain, only 23 p.c. of the men and 38 p.c. of the women were on piecework. It was most prevalent for men in the metal, engineering, and ship-building industries, and for women in textiles. In the U.S.A., where methods of payment by results have received much study, only 30 p.c. of employees were on piecework in 1945-46.

Disadvantages of piecework include the possibility of wastage of materials; the difficulty of developing a healthy working atmosphere within the factory; the danger of "going slow" in order to preserve a particularly favourable rate; the problem of fixing rates for various grades. To avoid these disadvantages many employers prefer to pay to a section or a whole shop a group bonus calculated on the difference between the work achieved and that estimated as the standard; or to pay an individual bonus based on the difference between the time estimated and that actually taken.

Early in the 20th century piecework was applied crudely, particularly in the engineering industry, as a means of compelling men to work without respite. High wages earned by a few workmen were used as an excuse for cutting rates. The zealous worker became anathema as a "rate-buster," and most trade

unions did everything possible to resist the introduction of piecework. More recent agreements provide that the piecework wage shall never fall below hourly rates. There is little need for piecework where the conveyor belt principle is used in manufacture, since the individual worker has to keep pace with the conveyor.

Pieck, WILHELM (b. 1876). German politician. He was born at Guben, Jan. 2, 1876, and was a Socialist member of the Bremen diet from 1906 to 1910. He joined the Communist party in 1918, being a member of the Prussian diet 1921-28 and of the Reichstag, 1928-33. As a member of the Comintern executive, he was attacked by the Nazis, but escaped to Moscow in 1933, living there until 1945, when he returned to Berlin. He became joint chairman of the Socialist Unity party, 1946, and first president of the E. German republic, Oct. 11, 1949.

Piedmont (Ital. *Piemonte*, foot of the mountain). Region of N.W. Italy. It is bounded N. by Switzerland, N.W. by Valle d'Aosta, W. by France, S. by Liguria, and E. by Lombardy and a portion of Emilia. It embraces the provs. of Alessandria, Asti, Cuneo, Novara, Turin, and Vercelli. It is mountainous on all borders but the E.; the remainder is a fertile plain. In the N. and N.W. are the Pennine and Lepontine Alps, in the W. the Graian and the Cottian Alps, and in the S. the Apennines and the Maritime Alps. The beautiful Lago Maggiore lies on its E. border. Piedmont is watered by the Po and its tributaries. The chief products are rice, maize, wheat, wine, olives, chestnuts, truffles, hemp, and silk. Silver, lead, coal, copper, and salt are mined and exported. Its area is 10,045 sq. m. Pop. 3,511,000.

In Roman times a part of Gallia Transpadana and Liguria, it was successively a part of the Ostrogothic, Lombard, and Frankish kingdoms, and in the 11th century was mostly acquired by Savoy, of which it became the most important part, Turin being the capital of the dukes. In 1718 the dukes became kings of Sardinia, their realm comprising that island, Piedmont, and Savoy, and this title was retained until Victor Emmanuel II became king of Italy in 1861.

Piedmontite. In mineralogy, name given to a variety of epidote, a manganian epidote, found in manganese ores at Piedmont, Italy; also in certain schists and occasionally in quartz porphyry. It

is reddish black in colour, and is sometimes used as a gemstone.

Pied Piper of Hamelin, THE. Poem by Robert Browning. Written for a child friend, Willie Macready, and published in *Dramatic Lyrics*, 1842, it is based on the old legend of a ratcatcher named Bunting, who, employed to rid the town of Hameln from rats, and denied the promised reward, enticed by his piping all the children of the town into a mountain-cavern, which instantly closed upon them. There are several variations of the story, e.g. those of the Fiddler of Brandenburg and the Hermit of Lorch, and in the folklore of China and Persia.

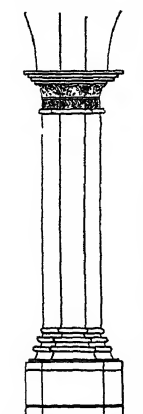
Piedras Negras. Town of Mexico, in the state of Coahuila. Formerly known as Ciudad Porfirio Diaz, it stands on the Rio Grande, at the S.W. end of the international bridge over this river to the U.S.A. at Eagle Pass, Tex., and is connected by rly. with Mexico City, 850 m. to S. The surrounding district has cattle breeding, agricultural, and fruit growing industries, of which the town is an important centre. It was founded in 1849. Pop. 18,900.

Pie-Powder or **PIEDPOUDRE**, COURT OF. Ancient court of record connected with every fair or market in England. It was the lowest court of justice, and, with the steward of the lord of the manor or the owner of the tolls as judge, administered summary justice for all commercial injuries in any particular fair or market. Its jurisdiction extended to all commercial injuries done in the fair or market, but not in any preceding one. Persons sentenced by the court had the right of appeal to Westminster. The name piepowder is an anglicised form of the old French *pié poudré*, dusty foot, a slang term for pedlar, in allusion to the condition of the accused and witnesses coming before the court. Although the jurisdiction of such courts is now obsolete, a Court of Piedpoudre, founded by Richard III, is held every Sept. in Bristol, and after being formally opened is adjourned.

Pier. In architecture, any isolated vertical mass of masonry, such as the supports of an arch, or the square or round posts on which a gate or bridge is hung. A number of columns grouped or clustered together is known as a compound pier; in this form the pier is a conspicuous feature of medieval architecture from the 10th century.

Bridge piers are the intermediate supports of a bridge, as distin-

guished from its end supports or abutments, and serve to distribute the weight of the superstructure



Pier. Clustered columnar pier in Norman architecture

and its load over a sufficient foundation area to prevent subsidence. They vary from simple timber supports to great masses of masonry on caisson foundations, such as the piers of the Forth Bridge. Timber piers consist of a grillage of cross-piled timber or of vertical posts, or of piles driven into the ground. Small timber piers are termed bents, and high braced piers are usually known as timber trestles. Steel and iron piers consist of columns, pillars, or stanchions resting upon masonry or piled foundations, sometimes braced together and joined at the top by a girder upon which the bridge superstructure bears; high braced piers are known as steel trestles. Masonry piers are of concrete, brick, granite, or other suitable stone built up from their foundations. Cylinder piers are constructed by weighting hollow steel or iron cylinders, sinking them down to the right level, excavating the soil, and filling them solid with concrete upon which the bridge girders rest. *See* Column; Pilaster; Pillar.

Pier. Jetty or staging projecting into a sea, river, or lake. A pier may be built of stone, being then more often called a mole, but usually consists of superstructure beams or girders carried upon intermediate supports, such as piles driven or screwed down to a secure foundation, carrying rly. or other traffic, and providing embarkation and landing facilities. In some waters the depredations of the teredo render timber unsafe and useless in a short time, and often creosoting proves of little use, so that steel and iron piers are constructed. In piers of reinforced concrete the superstructure and piles are of reinforced concrete, the girders and piles being built solid with each other. Along that portion of a pier where ships berth, fendering is provided, either of timber piles or of spring beams, which resist the impact of vessels. Mooring pawls or bollards are also placed.

The length of a pier depends upon the distance from the shore to a sufficient depth of water for vessels to moor alongside, and the length of berthing accommodation required. Often the outer end is enlarged or extended at an angle, as in the rly. pier at Port Limon (Costa Rica), or in the form of a tee head, *e.g.* the rly. pier at Bahia Blanca (Argentina), which supports large grain storage bins and elevators. Promenade piers, intended as no more than an amenity, may be seen at almost every popular seaside resort. Southend, Essex, has an exceptionally long pier for both rail and passenger traffic. Piers for goods traffic are equipped with cranes, conveyers, and other tackle. Piers serve much the same purpose as docks, and are sometimes constructed to serve as landing stages within a large dock. They can be rapidly erected, but owing to their exposed position afford no shelter to vessels, and are themselves liable to damage by storms and collision. During the Second Great War promenade piers on the E. and S. coasts of England had their central spans removed to prevent their being used by the Germans in the event of invasion. *See* Breakwater; Mole; Pile.

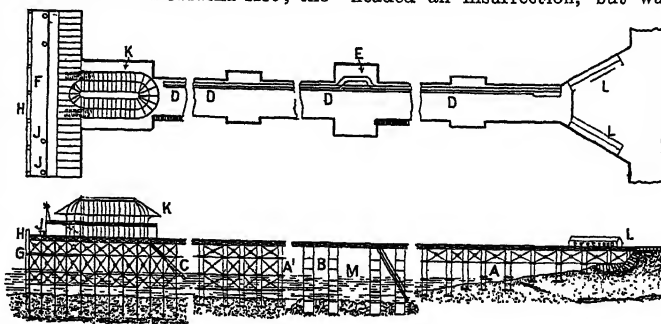
Pierce, FRANKLIN (1804-69). President of the U.S.A., 1853-57. Born at Hillsborough, N.H., Nov. 23, 1804, he was called to the bar in 1827. He was member of the lower house of congress, 1833-37, and of the senate, 1837-42, being a strong Democrat and a consistent supporter of slavery. After serving with distinction in the Mexican War, he was elected president in 1852 by a larger electoral vote than any previous candidate. His presidency was marked by the passage of the Kansas-Nebraska Act; the

Ostend manifesto, advocating the acquisition of Cuba by the U.S.A.; the Gadsden purchase; the disap-

pearance of the Whigs and the formation of the Democratic and Republican parties. After his term Pierce took little interest in public affairs, and died at Concord, Mass., Oct. 8, 1869. *See* Gadsden; *consult* Lives, N. Hawthorne, 1852; J. R. Ireland, 1888.

Pierlot, HUBERT (b. 1883). Belgian statesman. He graduated in law from Louvain university and entered politics as a member of the Catholic party. He became prime minister and foreign secretary on Feb. 20, 1939, resigned a week later, and in April formed a new cabinet after a general election. When the Germans invaded Belgium, he escaped to London by way of Spain, and became head of the Free Belgian government in the U.K. After the liberation of Belgium he returned to form a new cabinet in Sept., 1944, but resigned Feb. 10, 1945, upon Left wing demonstrations against him.

Pierola, NICOLAS DE (1839-1913). President of Peru, 1895-99. He was born at Camaná, Jan. 5, 1839, and educated at the college of Santo Toribio, Lima. He was called to the bar in 1860; founded the review, *El Progreso Católico*; and in 1864 became editor of *El Tiempo*. After travelling in Europe, he was appointed minister of finance 1869, but in 1872 was charged with misappropriating public funds, and went to the U.S.A. In 1874 he headed an insurrection, but was



Pier. Promenade pier with T-headed landing stage, showing different systems of construction. Top, plan; below, elevation. AA'. Cast-iron columns planted in firm sand. B. Steel cylinder or caisson planted on rock. C. Steel screw piles driven into firm mud. D. Tram line with crossing at E, where pier is widened to give increased strength sideways. F. Landed stage. G. Low level ditto. H. Timber fenders. J. Mooring pawls or bollards. K. Pavilion. L L. Offices and shops. M. Boat pass

defeated at Sorota, Dec. 3. Revolted again in 1877, he effected a revolution at Lima, and in 1879 became provisional president, but was defeated, and resigned in 1881. In 1894 he organized a revolt, and was president 1895-99. He died June 24, 1913.

Pierre. Capital of S. Dakota, U.S.A., and the co. seat of Hughes co. It is situated on the Missouri, and the Chicago and N.W. rly., 119 m. W. of Huron, and contains a government industrial school for Indians, a federal court house, the state capitol, and S. Mary's hospital. It has a great cattle market, and uses natural gas. It was settled in 1880 and incorporated in 1883. Outside the town is a monument marking "the approximate centre" of the N. American continent. Pop. 4,322. *Prom. Peer.*

Piers Plowman, THE VISION OF. Early English (14th century) allegorical poem written in about 14,000 short alliterative lines on the Anglo-Saxon model. Generally accepted as the work of William Langland, the poem achieved considerable contemporary popularity. Between three and four dozen old MSS. of it are known, these being divisible into three distinct versions. It has been suggested that the poem might be the work of several authors, but the three versions probably represent Langland's first text and two later recensions. The poem throws light on contemporary life and thought, and includes much vigorous satire on the prelates and friars. It was first printed in 1550. Recent editions include one in Everyman's Library.

Pietà (Ital., piety, compassion). Representation, in painting, or sculpture, of the Virgin mourning over the dead Christ taken down from the cross; also of any group of the holy women at the Deposi-

tion. The episode has formed the motive of innumerable pictures, among which those by G. Bellini, Correggio, Quentin Matsys, Van Dyck, F. Francia, and Rubens are noteworthy. *See Michelangelo.*

Pietermaritzburg OR MARITZBURG. City of S. Africa, the capital of the prov. of Natal. It stands 2,218 ft. above sea level near the Umsindusi river, 73 m. N.W. of Durban by rly. The chief buildings are the city hall, opened in 1901; the Anglican and R.C. cathedrals; the buildings where the legislature of Natal meets, and others erected for official use, including the law courts. There are also a university college, in the



Pietermaritzburg arms

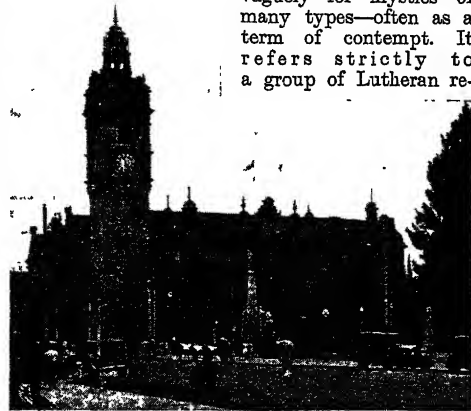
suburb of Scottsville, hospital, library, museum, and theatre. The city has a public park, and there is a botanical garden. The barracks at Fort Napier overlooks the city. There are several schools and training colleges. Pietermaritzburg is an important rly. junction being on the main line from Durban to the Orange Free State and the Transvaal. The industries include tanning and brewing, wattle extracting, and the making of wagons, footwear, and furniture. Annual mean temperature is 65°.

Pietermaritzburg was founded by the Boers in 1839, the name

being formed from those of two leaders, Pieter Retief and Gerrit Maritz. It became the capital of Natal in 1842, and was made a borough in 1854. During the First Great War German prisoners were confined at Fort Napier. Pop. 63,162 (35,607 white). *See Natal.*

Pietersburg. Chief town and administrative unit of the N. Transvaal, S. Africa. It stands near the source of the Sand river, 174 m. by rly. N.N.E. of Pretoria. It is the centre for extensive goldfields, and in the neighbourhood copper, antimony, tin, corundum and other minerals are worked, and timber is a thriving trade. The town became an important centre under the Native Trust and Land Act, 1936. The town was taken by the British in April, 1900. Pop. 11,000. Pietersburg gives its name to a district.

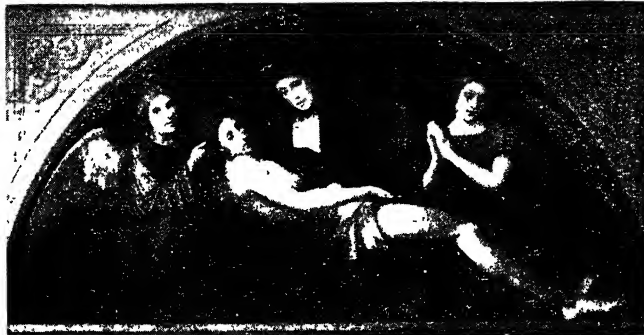
Pietists. Word used vaguely for mystics of many types—often as a term of contempt. It refers strictly to a group of Lutheran re-



Pietermaritzburg, Natal. The City Hall opened in 1901. The main hall has a seating capacity of 2,000

formers, who arose in Germany about 1670, under the leadership of Philip Jacob Spener (1635-1705). He was a Lutheran pastor at Frankfort who held devotional meetings called *collegia pietatis*, whence the name, and established a kind of Methodism. He taught no special doctrines, and founded no sect, confining himself to an endeavour to promote spiritual life generally; but some of his followers adopted a dress and customs rather like those of the Quakers. Under A. H. Francke (*q.v.*), Halle became the centre of the movement, which had much influence for good, but afterwards degenerated into bigotry and emotionalism. *See Mysticism.*

Pietra Dura (Ital., hard stone). Inlaid work consisting of black marble, jasper, agate, or other hard stones inlaid in wood or



Pietà painted by Francesco Francia, representing the Virgin holding the dead Christ, with S. John at His head and S. Mary Magdalene at His feet
National Gallery, London

marble. It is sometimes called Roman mosaic, but is not mosaic proper, which is embedded in cement. See Mosaic.

Piezometer (Gr. *piezein*, to press; *metron*, measure). Instrument for measuring the compressibility of liquids under varying pressure. The first piezometer was invented by Oersted in 1882, and consisted of a thick glass tube closed at each end by a brass cap, one of which was fitted with another tube containing a piston or screw plug, for applying pressure to the liquid in the first tube. This latter tube was fitted with a flask, the neck of which was drawn out into a thin tube and graduated. Pressure on the liquid is communicated to the liquid in the flask by a system of valves, and the amount of compression read off on the graduated tube.

Pig. Name applied to members of the family Suidae, which forms part of the even-toed group, the zoological order Artiodactyla or hoofed mammals. This family includes the true pig, bush pig, wart hog, and babirusa. The typical pigs include over a dozen species, the domesticated pig being merely a modified variety of one or more of the wild forms.

Pigs are distinguished from the animals nearly related to them by the very long head, terminating in a flattened disk-like snout, in which the nostrils are placed. The existence of this snout involves the presence of an additional bone in the skull for its support. Pigs have conspicuous tusks in both upper and lower jaws, the upper ones being reflected upwards, instead of pointing downwards as in most other animals. Each foot has four toes, of which only the middle two touch the ground when walking. Most have large and often pendent ears; their hair consists of bristles set comparatively far apart; and the tail is more or less bare, with a tuft at the tip. Pigs are not ruminants, having a simple and undivided stomach.

Of the various wild species, the European wild boar is the best known. All wild pigs frequent marshes and damp places, and this trait is seen in the tendency of the tame pig to wallow in any mud it can find; while the habit of turning up the ground with its snout is a survival of the root-hunting methods of its wild ancestors. The Chinese appear to have been the first race to pay attention to the domestication of the pig, though its remains are found in Swiss lake dwellings. The date of its

domestication in Great Britain is unknown.

There is little doubt that the domesticated breeds are the descendants of the wild swine of the various countries, British breeds being derived from the European wild boar, but they have been greatly modified by crossing with Chinese and other Asiatic breeds. Probably as a result of these crosses, domesticated swine have undergone many modifications, even the number of teeth and the vertebrae having changed. The skull has become altered in shape, for example, so that the straight face of the wild swine has given

ticularly hardy, it yields well in bacon, with a good proportion of lean; though of all breeds it matures probably the latest. It makes a good cross for introducing hardness into a delicate breed.

From about 1930 the Wessex Saddleback increased in popularity, for it is a hardy grazing pig with litter records at weaning time not excelled by other breeds. It is black with a white strip over the shoulder and fore legs. The Essex Saddleback is similarly marked, having four white feet instead of two. Both breeds crossed with the Large White produce excellent "blue grey" pigs for bacon.

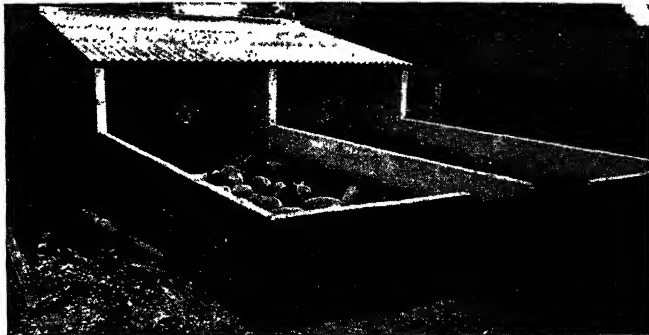


Fig. Type of pig-sty suitable for English conditions with yard open to air and sun, and entrance to covered yard protected by veranda

way to the concave one of most of the modern breeds.

Of white breeds, the Large and Middle White (Yorkshire) are most important. The former sometimes reaches a live weight of 10 cwt., yields a better proportion of lean to fat than most other breeds, and turns out equally well for pork or heavy bacon. It is a hardy breed, of quiet and restful disposition—an important point with the fattener. The sow is prolific and makes an excellent mother.

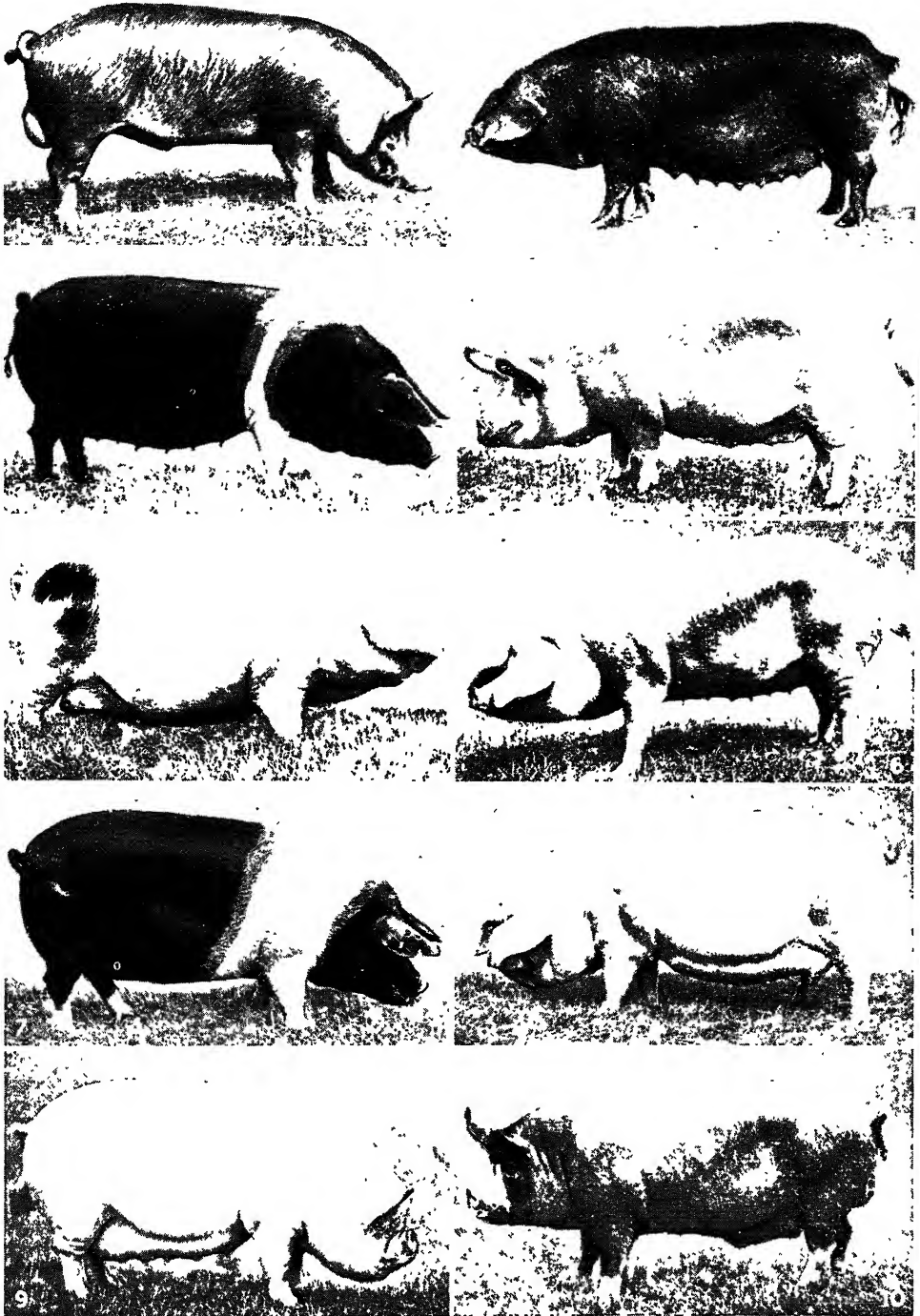
The Middle White is the result of a cross between the Large and now extinct Small White breeds, combining their good points. It has a short head, turned-up snout, and a general air of compactness. It is chiefly in demand for the pork trade, and is useful for crossing with coarse and nondescript breeds to improve their quality. Other white breeds are the Lincolnshire Curly Coat, Cumberland, and Long White Lop-Eared.

Of the coloured breeds, the Tamworth, mainly to be seen around Birmingham, more closely resembles the wild boar, from which it is a more direct descendant, than any other breed. It is long, and nearly straight in the head, and its body is covered with long, red hair. Par-

The Berkshire breed is black, except the face, feet, and tip of the tail; and where colour is not objected to in the market, it is a profitable breed to keep. It is hardy even in hot climates, breeds freely, matures early, and produces fine hams. The Large Black, hardy, prolific, and a good grazer, may be crossed with the Large White for either pork or bacon.

The pig is not naturally dirty, but quite a clean animal if given the opportunity. Hence a dirty pig-sty is quite as wrong and objectionable as a dirty stable or cow-byre, and tends to impair the health of the animals. Sties should have a S. aspect, should be large, well ventilated, well lighted, and scrupulously clean. Frequent whitewashing of the walls of the sty and court greatly conduces to cleanliness. Litter should be provided, peat moss being avoided, as the pigs are apt to devour it. Wheat straw is best for very young pigs, while fattening pigs can entirely dispense with litter. When pigs are kept in confinement a lump of rock salt should be provided.

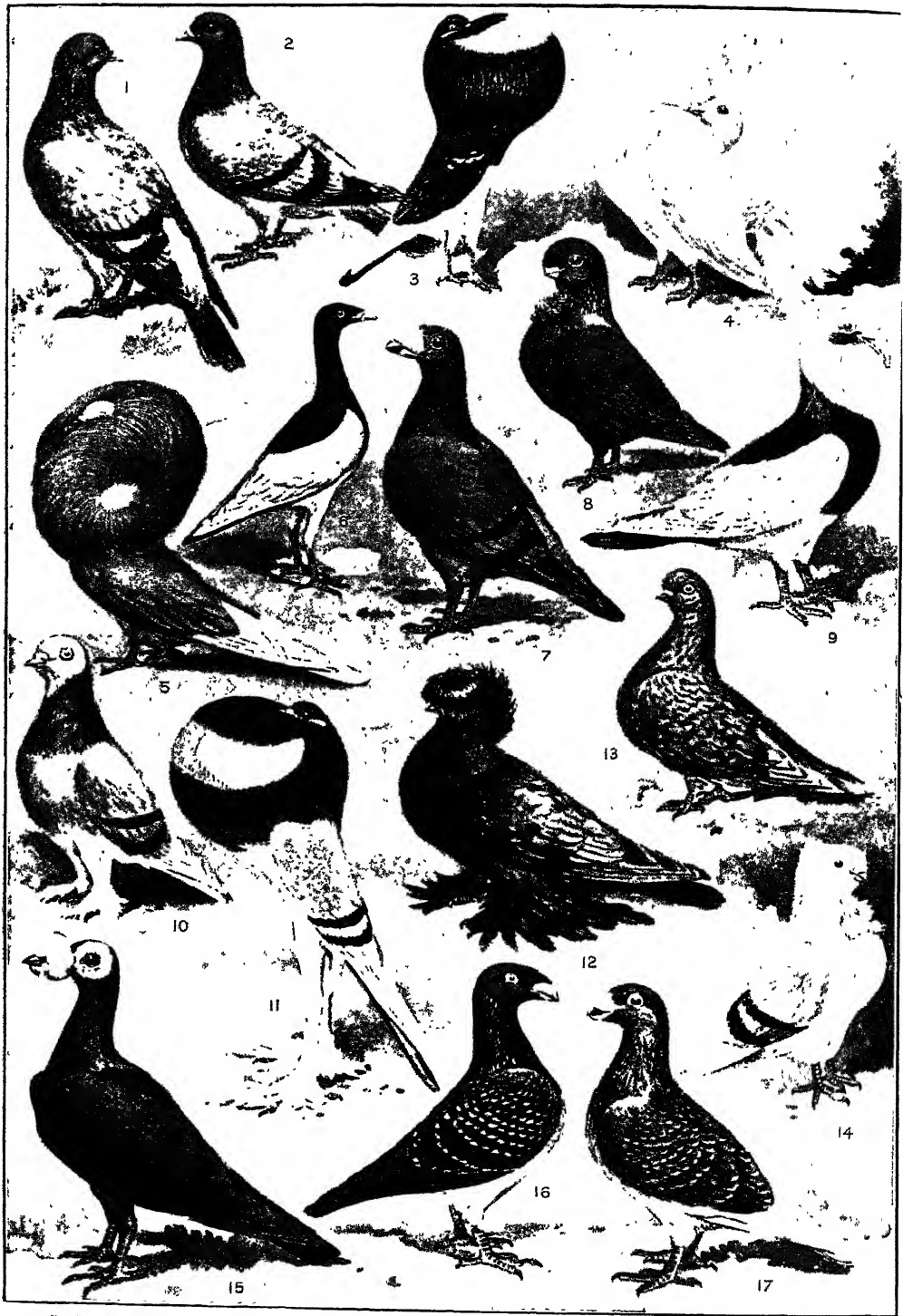
Pigs are omnivorous, and when they chiefly live on the waste products of the farm are very profitable. Apart from swill, with



1. Tamworth boar 2. Large Black sow 3. Wessex Saddleback sow. 4. Large White sow 5. Gloucester Old Spot sow. 6. Welsh sow. 7. Essex sow. 8. Cumberland sow 9. Middle White sow. 10. Berkshire boar

FIG: TEN PRIZE SPECIMENS OF FAMOUS BRITISH BREEDS

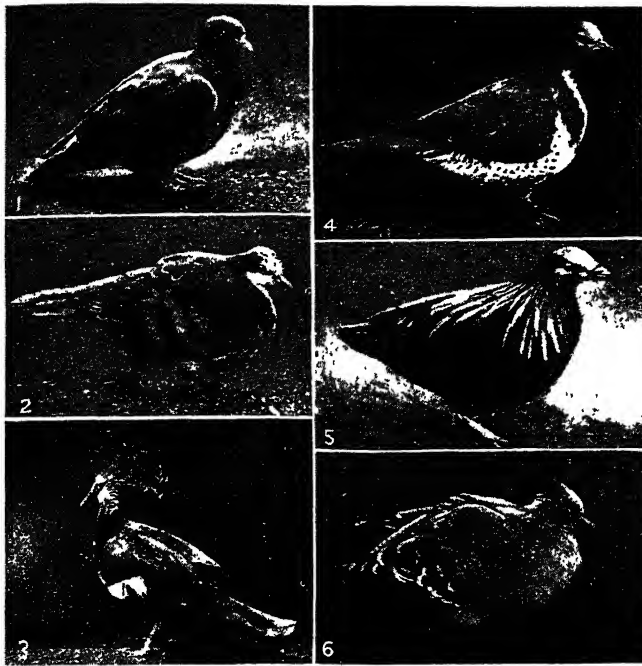
By courtesy of The Farmer and Stock-Breeder



1. Rock-dove (*Columba livia*), the origin of domesticated species. 2. Common Dovecote Pigeon. 3. Norwich Cropper. 4. Fantail. 5. Jacobin. 6. Magpie. 7. Blue Dragon. 8. African Owl. 9. Scanderoon. 10. Blue Bald High-

11. Blue Pouter. 12. Trumpeter. 13. Short-faced Almond Tumbler. 14. Blue Turbit. 15. Black Carrier. 16. Blue Chequer Show Homer. 17. Red Chequer Short-faced Antwerp.

PIGEON: EXAMPLES OF THE BIRD BRED FOR EXHIBITION PURPOSES



Pigeon. Examples of crested and other varieties. 1. Puerto Rico pigeon. 2. Blood-breasted, Philippines. 3. Crowned, New Guinea. 4. Wonga-wonga, Australia. 5. Nicobar pigeon. 6. Crested, Australia.

whey and buttermilk from the dairy, to which skim milk may with advantage be added, barley meal, brewers' grains, peas, beans, oats, and maize are all useful foods. In the fattening process, which gives the best result if crosses are used, too much maize conduces to flabbiness in the flesh, while an excessive use of peas and beans causes hardness. Various roots are added to the dietary in winter, and such things as clover and vetches in the summer; pigs are often turned out to forage for themselves in grass fields or over stubble. They require frequent feeding, but the food should be given in small amounts.

Pigs are weaned at from six to eight weeks after birth, and until they are able to feed miscellaneously their diet largely consists of a mixture of sharps and bran, with an increasing amount of barley meal, boiled potatoes, skim milk, and various meals as available. Before they reach about five months the sharps and bran should be replaced by meal. See *Animal: Babirusa; Bacon; Mammal; Pork; Swine-fever*.

Bibliography. Pig Breeding and Feeding, E. Forman, 1937; Good Pig Keeping, H. L. Tinley, 1947; Pigs, J. W. Reid, 1948; Production and Marketing of Pigs, H. R. Davidson, 1948.

Pigeon. Name applied to the various species of birds of the order Columbiformes, which includes pigeons proper, doves, and the extinct solitaire and dodo (*q.v.*). There are about 60 genera included in this order, and the typical pigeons, *Columba*, number about 70 species, distributed over nearly the whole world with the exception of the polar regions.

Most pigeons are strong fliers. They are all monogamous and pair for life when under natural conditions, the promiscuous courtships of the domestic pigeon being simply a mark of degeneracy due to life under abnormal circumstances. Both cock and hen assist in the incubation and care of the young. The eggs are always white, and one or two in number. A large distensible crop enables the birds to take huge meals. A pigeon has been known to eat more than its own weight in food at a meal. Another peculiarity of the group is that the young are fed with partially digested food by the parents, whose crops during the rearing season secrete a peculiar fluid—the so-called pigeon's milk.

In Great Britain three species of pigeon occur in the wild state, the stock dove, the wood pigeon, and the blue rock pigeon. The turtle dove also breeds in Great Britain,

but it is only a summer visitor, arriving early in May and leaving in Sept. It is smaller than the other three species and is seldom seen, as it keeps within the densest foliage. It is spread over the whole of Europe, except the extreme N., and in winter migrates to Africa.

The stock dove may be distinguished from the common wood pigeon by its smaller size and plainer grey plumage. It is found mainly in the S. and E. counties of England.

The wood pigeon is much the largest of the three native species, and is one of the common objects of the country, where it does great damage by consuming peas, corn, and newly planted seeds. A white patch on either side of the neck at once distinguishes it from the other species. This is the species common in the parks and open spaces of London.

The blue rock pigeon, a smaller bird with bluish-grey plumage, is mainly found around the N. coasts of Scotland and Ireland, where it nests on ledges in caves or in crevices in the rocks. The various domesticated breeds have been derived from this breed.

The domestication of the pigeon and its use as a message bearer date from an early period. No remains of it have been found in prehistoric encampments or kitchen middens, but it was well known to the Greeks and Romans, who used messenger pigeons, while the rock pigeon and the turtle dove are several times mentioned in the Old Testament. The domesticated pigeon has received great attention at the hands of fanciers, the number of strains is now large, and many of these birds differ in form to such a degree that they appear to be almost different species. Darwin selected this fertile group for the study of variation in relation to the evolution of species.

The pouter is distinguished by its enormous crop, long feathered legs, and upright carriage, which give it an eccentric and uncomfortable air. The carrier, not now the message-bearing bird, is known by the large naked callosities around the eyes and base of the bill. A long massive bill distinguishes the runt. The barb is known by its short broad bill, and broad callosities round the eyes.

The fantails, of which there are several sub-varieties, have upstanding expanded tails, the feathers of which are often directed forwards over the head. The normal number of tail feathers in the typical pigeon is twelve, but

the fantail usually has about 30, and occasionally 40. The owl pigeon and turbit have a very short bill, and the feathers diverge down the front of the neck and on the breast.

The tumbler is a small bird, and gets its name from its habit of tumbling backwards during flight. The Jacobin is easily recognized by the feathers of the neck forming a kind of hood which almost encloses the head. The trumpeter, so called from its peculiar, prolonged coo, has a tuft of feathers at the base of the bill which curl forwards. The homer is the pigeon used for bearing messages.

Pigeons are fairly hardy birds, but need reasonable attention to keep them in good condition. They should have a roomy and well-ventilated loft; be kept dry and guarded against draughts; have varied food, and a good supply of fresh water for both drinking and bathing. It is a criminal offence to kill or wound a tame pigeon. See *Birds colour plate*; *Feather*; *Flight*; *Fruit Pigeon*; *Pigeon colour plate*. Consult *The Book of Pigeons*, R. Fulton, ed. L. Wright, 1895.

Pigeon Flying. Sport in which pigeons race against one another. It developed from the ancient practice of using pigeons to carry messages, and first became popular in Belgium, where races were instituted about 1820, a special type of bird being bred for them. It was introduced into England about 1871, Belgian birds being brought over. In 1880 a club was founded, and in 1896 the National Homing Union, the controlling body of the sport, came into existence. The organ of the sport is *The Racing Pigeon*. About 1875 the sport began to be popular in the U.S.A.

Racing pigeons may be divided into two varieties, sprinters and long distance performers; birds flying any distance up to 250 m. coming in the former category, and those able to accomplish 600 m. in the latter. The usual plan is to take the birds the necessary distance from their homes and then to release them, when they will fly back. Hence the term homing pigeon or homer. Some birds can fly nearly 2,000 yds. a minute, and one has been known to fly over 1,000 m. Squeakers, as the young birds are termed, should be trained gradually by increasing the distance each day, and should be able to accomplish a flight of 100-150 m. by the end of the first season.

Rings with identification marks are placed on their legs.

In the Second Great War, British fanciers placed their homing pigeons at the disposal of the army and R.A.F. All aircraft of Coastal Command carried one or more pigeons to maintain contact with base in the event of their being forced down and their radio transmitters put out of action. See *Animal: Employment in Wartime*; *Homer Pigeon*. Consult *Pigeon Racing*, W. E. Barker, 1913; *Widowhood System of Pigeon Racing*, W. S. Pearson, new edn., 1947.

Pigeon House. Building to accommodate pigeons, known also as a columbarium. In the Middle Ages nearly every castle, manor house, and monastery had a building with nests for pigeons, these birds being a favourite article of food, and their culture inexpensive to the owners, inasmuch as they preyed on the fields of the tenants. The pigeon house was usually a round tower, with an opening at the apex of its conical roof, protected by an upper roof, through which the birds could come and go. Inside, the walls were pitted with small recesses for the nests. In the centre was a revolving post with horizontal arms extending almost to the wall, and at the ends of these arms was fixed a vertical ladder, by means of which access could be had to the nests.

Pigeon Post. Mail service carried on by trained homing pigeons. This method of transmitting news has frequently been employed in wartime, particularly in attempts to maintain communication between the defenders of a besieged town, e.g. Paris, 1870-71, and their friends outside. In 1890 a pigeon post service was established between Suva and the outlying islands of the Fiji group. It is also used by military aircraft on sea-patrol work in case of a forced landing at sea, etc. The message, written in cipher in small compass, is rolled in a quill, which is attached to the bird. During the First and Second Great Wars pigeon services were employed by all the combatant nations. See *Homer Pigeon*.

Pigeon Shooting. Shooting of practically tame pigeons released from traps. It was formerly a popular form of competition at Monte Carlo, but following a campaign against the cruelties involved which was started by *The Times*, 1921, the practice was discontinued, mechanical clay birds being substituted. The practice was also

prohibited in the U.K. by the *Captive Birds Shooting (Prohibition) Act*, 1921.

Pig Iron. Crude form of iron (91-96 p.c. purity) produced by smelting iron ores with fluxes and coke (or charcoal) in the blast furnace. Quality and composition depend on what makes up the ores, fluxes, and coke (or charcoal) charged into the furnace, and on the working conditions of the latter. The quality is usually judged from the appearance of the fractured surface of the iron after it has solidified reasonably slowly, as in a pig bed. Pig iron is either remelted to provide cast iron for castings, or refined to produce steel.

The iron is intermittently tapped from the blast furnace in the molten state, and may then be run into pig beds to solidify. These beds consist of a sand floor in which channels are formed; the molten metal from the furnace runs along a main channel, branches off from this at right angles on either side into subsidiary channels, and again at right angles into smaller channels closed at the far end. The appearance of the metal at this point in the process suggests pigs being suckled by a sow. Pig iron emerging from the blast furnace may alternatively be run into ladles; it may then be poured into metal moulds on a casting machine, or conveyed direct in the molten state to a furnace for refining into steel.

Pigment. In animals, the colouring matter in the dermis or epidermis. Brown to black in most mammals and in man, it is found in the cells of the Malpighian layer. The colouring matter of birds is chiefly found in the feathers. In the case of crustaceans, many fish, and insects there are special colour-secreting cells. Animal pigments consist chiefly of melanin, a black colouring matter insoluble in water, alcohol, acid, or ether; zooerythrin, a red colouring matter; and zooxanthin, a yellow pigment, found chiefly in the feathers of birds, are lipochrome pigments. Certain pigments are confined to certain animals, e.g. the turacin pigment of the Musophagidae. Haemoglobin, the red colouring matter of blood, and its derivatives are the best known animal colouring matters from a chemical point of view, the great majority of animal pigments being present in such small quantities, though giving a large coloration effect, as to make

accurate chemical analysis difficult. Much of the colour of many animals is due to a peculiar absorption of light, and not to pigments. See Colour; Skin.

Pigment. In plants, pigments occur most commonly in colloidal association with the protoplasm of plastids, or distributed in the cell sap. Four are present in most coloured plastids. They are chlorophyll *a* (COOCH_3) ($\text{COOC}_{30}\text{H}_{39}$) ($\text{C}_{32}\text{H}_{30}\text{ON}_4\text{Mg}$), chlorophyll *b* (COOCH_3) ($\text{COOC}_{20}\text{H}_{39}$) ($\text{C}_{32}\text{H}_{28}\text{O}_2\text{N}_4\text{Mg}$), carotin ($\text{C}_{40}\text{H}_{56}$), and xanthophyll ($\text{C}_{40}\text{H}_{56}\text{O}_2$). The first two, both green, are methyl phytyl esters of the acids chlorophyllin *a* and chlorophyllin *b* respectively. They are essential for photosynthesis (*q.v.*). The last two, called carotinoids, respectively orange and yellow in colour, are masked by the relatively large quantities of the chlorophylls in chloroplastids. In the chromoplastids which give colour to some flowers and fruits either carotin or xanthophyll or a mixture of the two predominates, though in red tomatoes and red pepper another carotinoid, lycopin ($\text{C}_{40}\text{H}_{56}$), differing structurally from carotin, is the chief colouring material. Plastids of brown algae contain an additional carotinoid, fucoxanthin ($\text{C}_{40}\text{H}_{56}\text{O}_8$); those of the red algae have a predominating red pigment, phycoerythrin, sometimes accompanied by a blue one, phycocyanin, the reverse being true of the blue-green algae.

Yellow sap pigments, such as provide the colour in the petals of the yellow flowered variety of the snapdragon, are widely distributed in plants, though as a rule their concentration is too low for them to be apparent. Treatment of tissue in which they are present results in a bright yellow coloration. These pigments, of which a number are known, are hydroxyl or methoxyl derivatives of flavone (phenylbenzo- γ -pyrone), flavonol, or xanthone (dibenzo- γ -pyrone), or alternatively such derivatives in glycosidal combination with sugar. They are called the flavonic and xanthonic pigments. A second series of sap pigments, the anthocyanins, give the red, purple, and blue colours to many stems, leaves, flowers, and fruits. They are chemically closely related to the flavone pigments, most of them being reduced flavonol glycosides, and differ amongst themselves like the flavonic pigments in the number and position of the hydroxyl or methoxyl groups. Many anthocyanins change colour with changes of acidity.

Pigments. Coloured substances which, ground to a fine powder, are used in the preparation of decorative and protective coatings. The art of preparing pigments reached a fairly high standard in Egypt 6,000 to 8,000 yrs. ago. Formerly the painter ground his own pigments in the selected medium, but the manufacture of pigments is now a highly specialised industry, and they are supplied to the paint-maker purified and ground ready for incorporation in the intended medium. Pigments should have the required colour and strength, should readily disperse in the mediums, and should give pastes which will remain stable and uniform even if kept for a long time before use.

Most important of the synthetic organic colours used as pigments are the lake colours, which are insoluble compounds formed from the soluble dyestuffs. The acid dyestuffs form insoluble salts with many metals, the chief being barium and aluminium. The basic dyestuffs form insoluble salts with some acids, the chief being tannic and phosphoric. A series of lakes which are very fast to light is formed by using phosphomolybdic or phosphotungstic acids.

These coloured precipitates are very powerful stainers and can be diluted with large quantities of bases such as alumina or blanc fixe (precipitated barium sulphate) which, having no tinctorial power themselves, supply the deficiencies of the pure lake without seriously affecting their colouring power. To ensure perfect admixture of the lake and the base the two are often precipitated together. Well known lakes of this type are the "Helio" reds, blues, and yellows. Some of these synthetic precipitates are among the fastest pigments to light known.

Pigment dyestuffs are insoluble organic dyes which require only to be incorporated with the base to be ready for use. They are very powerful stainers and very fast to light. Lithol and monolite pigments belong to this class.

Adjective dyestuffs, of which the alizarin colours are typical, are insoluble in water and very fast to light.

Monastral blue, an organic pigment introduced in 1935, which has different chemical constitution from other organic pigments, is fast to light and to both alkali and acid, and withstands heat up to 200° C.

Inorganic pigments are of two kinds, those of mineral origin, such as the ochres and red oxides, which owe their colour to iron in various stages of oxidation; and those prepared by chemical processes, *e.g.* Prussian blue, lead chrome, ultramarine.

Pigments of mineral origin are treated by grinding the natural product and removing impurities and coarse particles, usually by levigation. Chemical treatment may be necessary to remove undesirable compounds, *e.g.* in barytes, the finest and whitest of which are treated with acid to remove the last traces of iron and silica. Chemical processes used in preparing pigments vary. Many, such as Prussian blue, are prepared by precipitation; others, *e.g.* ultramarine, are prepared by fusion. Lithopone requires heat treatment of the precipitate to develop its pigment properties. Removal of impurities is invariably essential, and rigid control of conditions at all stages of manufacture is of vital importance.

The Chief Pigments

The principal pigments are: *Alizarin* (*q.v.*) lakes; *Antimony oxide* ("Timonox"), a white pigment, acidic in character, so that it can be used with media which would react with basic pigments such as zinc oxide. The film tends to be soft and elastic. "Timonox" works well with zinc oxide, which has opposite tendencies.

Asbestine, which may be either powdered waste asbestos, a variety of the mineral hornblende (*q.v.*), or talc or French chalk, a hydrated magnesium silicate. Asbestine is not strictly a pigment but is an extender used to prevent the settling of heavy pigments.

Aureolin: a complex nitrate of potassium and cobalt, and a brilliant, pure yellow; used by artists.

Barytes: powdered mineral barytes, a natural barium sulphate; used as a base and extender with pigments of high covering power and with white pigments. It is a hard, inert substance with a crystalline structure. In moderation it improves the durability of the paint film and in undercoats the slight "tooth" it gives improves the adhesion of subsequent coats.

Blanc Fixe. barium sulphate prepared chemically by precipitation, softer and much finer than barytes and used as an extender where softness and fineness are important. It is much used as a base for lake (*q.v.*) colours. In

oil it gives almost colourless films, but in water has considerable opacity. Artists give it such names as permanent white.

Brown Pink: a lake prepared from quercitron bark, of a yellowish brown colour; used by artists.

Brunswick Blue: a reduced Prussian blue (q.v.).

Brunswick Green: a reduced Chrome green (v.i.).

Burnt Sienna: calcined Raw sienna (v.i.).

Burnt Umber: calcined Raw umber (v.i.).

Cadmium Yellow: precipitated cadmium sulphide, a very permanent but rather expensive yellow pigment much used by artists and to some extent in very high class decorative paints.

Carbon Black: prepared by burning natural gas and collecting the soot. By regulating the conditions of combustion, a great variety of blacks can be obtained which give pastes with oil media of a very wide range of physical characteristics. It is of great staining power and much used in printing ink manufacture.

Other carbonaceous pigments are *Vegetable Black*, made by burning vegetable oils, usually colza oil, and collecting the smoke; *Lamp Black*, a cheaper material made by burning a variety of substances and collecting the smoke; *Bone Black*, made by calcining bones; *Ivory Black*, from ivory; *Vine Black*, made originally by calcining vine twigs but now made from various similar vegetable materials; *Drop Black*, bone black mixed with gum water and formed into pellets.

Carmine (q.v.).

China Clay (q.v.).

Chinese Blue: a variety of Prussian blue (q.v.) of high grade and purity.

Chinese White (q.v.).

Chrome Green: a mixture of Prussian blue and lead chrome; the best grades are made by precipitating the two pigments together. The pigment is often made reduced with barium sulphate and called Brunswick green.

Chrome Yellow (q.v.). The usual grades are lemon, pale, mid, and deep. Chromes are the most important yellows used in paint and with Prussian blue give the most important greens for general use. They are durable, fast to light, and have great protective value, particularly on iron work.

Chrome Oxide: green oxide of chromium, a very permanent green highly resistant to chemical action. It is used on walls and

surfaces where attack by alkalis must be resisted, and chrome green therefore cannot be used. It is expensive and somewhat transparent. As an artist's colour it is known as Veridian Green.

Cobalt Blue: a complex phosphate of cobalt and alumina; a very pure transparent blue much used by artists.

Flake White: a variety of White Lead (q.v.).

French Blue: a variety of Ultramarine (v.i.).

Indian Red (q.v.): see Iron oxide pigments below.

Iron oxide pigments: these are of three classes. The first class occur naturally, and are prepared by grinding the mineral and separating the fine particles by levigation. Natural oxides come from Spain, chiefly the Malaga district—c. 10,000 tons a year are imported from Spain by the U.K. alone—and from the Persian gulf, whence a very fine red oxide sometimes called Indian Red is imported from Hormuz.

The second class, chemical oxide pigments, are prepared by heating ferrous sulphate (green vitriol) which, on decomposing, leaves iron oxide, the degree of oxidation, and hence the colour, depending on the conditions of manufacture. Colours range from red to purple red and black. The lightly coloured products are termed Turkey Red, the heavily coloured Indian Reds. These pigments, of great staining power, are much used in paint manufacture, particularly for industrial paints and protective paints for iron. They are chemically stable and unaffected by light.

The third class are precipitated oxides: by varying conditions of precipitation, and blowing in air to promote oxidation, a wide range of iron oxides and hydrated oxides can be produced from green vitriol ranging from yellow to black in colour. These ferrite colours are softer and finer in texture than the other iron oxide pigments.

Light Red: calcined ochre (v.i.). *Lithopone* (q.v.), also called Orr's zinc white, is a white pigment much used particularly for inside decorative work. The films are somewhat soft and lacking in durability and it is therefore often combined with zinc white, which corrects these deficiencies.

Monastral Blue (v.s.).

Ochres (see Ochre). The siennas and umbers belong to the same class of pigment, which includes the earliest used by mankind.

These were the pigments used in crude form by the cave dwellers of prehistoric times, traces of whose work remain in the caves of the Dordogne and elsewhere. The best ochres are a bright yellow and of considerable opacity and staining power; the siennas and umbers are transparent. All are permanent colours much used in the paint trade.

Paris White: the purest and finest grade of Whiting (q.v.).

Prussian Blue (q.v.).

Raw Sienna: a natural earth consisting of clay coloured with iron oxide and smaller amounts of manganese. It is of characteristic brownish yellow shade and transparent in oil media.

Raw Umber: similar in constitution to sienna, but containing more manganese. The colour is dark brown and transparent in oil.

Red Lead: a complex of lead monoxide and lead peroxide. It has been used since at least 100 A.D. It is made by oxidising molten lead by heating in a specially designed furnace. The oxide forms a scum on the surface and is scraped off. This scum, massicot, is bright yellow and of coarse texture. It is ground and heated under carefully controlled conditions, when the red oxide is formed. Red lead is a very heavy, bright red pigment. In linseed oil it acts as a vigorous drier and the paste tends to set hard in a short time, but non-setting varieties have been introduced. Red lead is very valuable in priming and undercoats, where its power of forming a hard uniform film is of advantage in producing durable protective coatings.

Titanium White: introduced in 1927, it consists essentially of titanium oxide. Rutile in Norway is the main European source; monazite sand from India and similar types from S. America are also used. The mineral is extracted with sulphuric acid and the dissolved titanium sulphate precipitated as a hydrated oxide. This is filtered off and calcined alone or mixed with barium sulphate. Titanium white is the purest white known and has great opacity and covering power. It is very inert and, unlike lead, is not discoloured on exposure to sulphurous fumes or attacked by acids. Titanium pigments contain between 25 p.c. and 98 p.c. of the oxide.

Ultramarine: a complex sulpho silicate of alumina and soda. The original ultramarine used by artists in the middle ages was extracted from the valuable min-

eral lapis lazuli. Gurnet in France, Gmelin and Kotting in Germany all solved the problem of producing a chemical substitute almost simultaneously in 1828. A mixture of china clay, soda ash, sulphur, and charcoal is heated under carefully controlled conditions. The mass is broken up, washed carefully, and ground, and the particle size graded by levigation. Various shades can be produced by modifying the process, but the characteristic product is a beautiful pure blue which is transparent in oil and has considerable staining power. It is not affected by alkalis and is therefore used in distempers and water paints containing lime, where Prussian blue could not be used. It is very fast to light but very sensitive to acids. By itself it is not very satisfactory as an oil paint, but with other pigments and extenders is useful. It is much used in industries such as laundering and sugar making to correct a natural yellowish tinge. White lead paints are also often treated with ultramarine to correct their yellowish cast.

White Lead (q.v.).

Zinc White: see Chinese White. See Colour Mixing; Paint.

T. Hedley Barry.

Pigott, RICHARD (c. 1828-89) Irish journalist and forger. A native of Meath and associated with several journals of an extreme Nationalist type, he forged papers purporting to incriminate C.S.Parnell (q.v.) in the murders of Lord Frederick Cavendish and Thomas H. Burke in Phoenix Park, Dublin, May 6, 1882. His guilt having become apparent in cross-examination before the Parnell Commission, he confessed to H. Labouchère, the editor of Truth, fled to Spain, and shot himself in Madrid, March 1, 1889. Consult his Personal Recollections of an Irish Journalist, 1882.



Richard Pigott,
Irish journalist



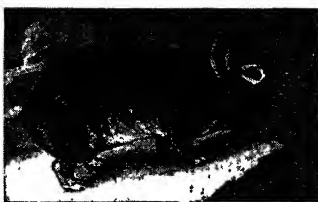
Pigtail as formerly
worn in China

Pigtail.

Long plait of hair worn at the back of the head. Among the Chinese the shaven head and pigtail were a mark of servitude imposed upon them in the 17th century by their Manchu conquerors. Later it became a source of pride

to the Chinese but went out of favour after the revolution of 1911. A queue or pigtail was worn in the British army and navy until 1808. In the West it is now seen only in the form of the plait of the schoolgirl, which also became less usual after 1925.

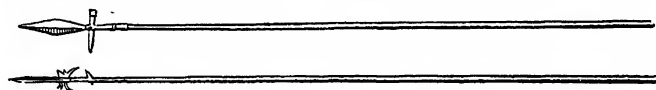
Pika OR **TAILLESS HARE** (*Lagomys*). Genus of rodents. Found in Russia, Asia, and N. America,



Pika or tailless hare of the mountains
of Russia and N. Asia

they live among the mountains, burrowing and living in crevices of the rocks, and feeding mainly on grass. The pika is about the size of a guinea-pig. See Rodent.

Pike. Infantry weapon used for thrusting. It consisted of a staff with a long metal lance-head or sharp spike at the end, and sometimes a spike also at the butt for striking into the ground. Its handle or staff was often from 12 to 14 ft. long. Pike-men are first noted as such in the 15th century, and played a great part in the wars of the 17th century. Sergeants in British infantry regiments carried pikes in action until the end of



Pike. Examples of the weapon as used, top, in the Parliamentary army; below, by troopers of Charles II

Pig-sticking. Wild boar hunting. Riding to hog, as the sport is termed, was long a popular form of sport among officers of the British army in India.

the 18th century. Certain Home Guard units in the early part of the Second Great War were armed with pikes until rifles were available. See Arms; Spear.

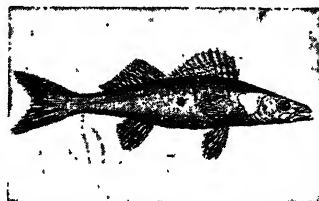
Pike (*Esox*). Genus of fresh-water fishes. They are found in most temperate regions of Europe,



Pike. Specimen of the voracious
fresh-water fish

Asia, and America. The common pike (*E. lucius*) occurs in British rivers, and is long and narrow in shape, a fine specimen attaining a length of nearly 4 ft. and a weight of nearly 40 lb. The head is broad and flattened, and the protruding jaws are armed with sharp teeth. In colour it is olive grey above, thickly spotted with a lighter tint, and silvery on the under parts. It has the power of considerably modifying its hue to match its surroundings. It is noted for its great voracity, preying not only on other fish, but upon water fowl, water voles, frogs, and worms. Small specimens known as jack afford good sport. See Angling; Fish.

Pike Perch (*Lucioperca*). Genus of fish, belonging to the perch family. They occur in the rivers of E. Europe, Asia, and N. America. Some three feet long, and pike-like in shape, they prey upon other fish.



Pike Perch of East European rivers

Pike's Peak. Peak of the Rocky Mountains, in Colorado, U.S.A. It is 7 m. W. of Colorado Springs, is named after Lieut. Z. M. Pike, who discovered it, 1806. Its alt. is 14,108 ft. and it was first ascended by Major S. H. Long in 1819. A rack and pinion rly., 9 m. long, was opened in 1891, and in 1905 a searchlight was erected.

Pila. Polish name of the Pomeranian town of Schneidemühl (q.v.).

Pilar. Port of Paraguay on the Paraguay R. in a district producing cattle, hides, timber, cotton, and oranges. There are cotton ginning mills, distilleries, and saw-mills. Pop. 10,000.

Pilaster (Ital. *pilastro*, from Lat. *pila*, a pillar). A flat-faced pier engaged with or attached to a wall, from which it projects slightly. It has a capital shaft, and base, and in Roman work was used

as a respond to the column. Renaissance builders often used it, and it figures largely in the Palladian style (*q.v.*).

Pilate, **PONTIUS** (Lat. *Pontius Pilatus*). Roman procurator or governor of Judea A.D. 26-36. His administration was severe and offensive to the Jews, of whom he was contemptuous, but the N.T. narratives of the trial of Jesus before him credit him with a sense of justice and a desire to save Him. Only when the Jews threatened Pilate with a charge of treasonable complicity with a pretender did he hand over Jesus into the hands of His accusers to be crucified (Matt. 27; Mark 15; Luke 23; John 18-19). Called to Rome to answer charges against him, Pilate is said to have been banished to Gaul, and to have committed suicide. The Copts declare that he died a Christian martyr; the Ethiopic Church regards him as a saint, his day being June 25. His wife, Claudia Procula or Procla (Matt. 27), is honoured by the Greek Church as a saint, her day being Oct. 27. Apart from the N.T. the authorities for the character of Pilate are Philo, Josephus, and Eusebius. *See* Jesus.

Pilatus. Mountain mass of central Switzerland. Situated between the cantons of Lucerne and Unterwalden, about 5 m. S. of Lucerne, alt. 6,996 ft., it commands one of the most extensive views in Switzerland. The Frac-

tus Mons of the ancients, in the Middle Ages it was called Mons Pileatus—the capped mountain, from its generally cloud-capped summit. From a misunderstanding of this name arose the legends connecting the mountain with Pontius Pilate. There is a mt. rly.

Pilch, **FULLER** (1803-70). English cricketer. Born at Horningtoft, Norfolk, March 17, 1803, he became a tailor. A keen cricketer, he was soon playing for the county, two brothers winning the same distinction, and was a member of a strong eleven at Bury St. Edmunds. In 1827 he first played for England, and during 1836-54 he played regularly for the Kent team. He died May 1, 1870.

Pilchard (*Sardina pilchardus*). Fish of the herring family. It is found in the English Channel west of Portland, and off the coasts of Portugal and Spain; there is a smaller race in the Mediterranean. It is about 8-10 ins. long at maturity, and may be distinguished from the herring by the larger size and smaller number of the larger scales and by the absence of teeth. Immature pilchards in their first year taken off the W. coast of France and tinned in oil are the true sardines of commerce. Pilchards are taken off the Cornish shore in the late autumn and throughout the winter.



Pilchard. Large-scaled fish of the herring family

The seine net is chiefly used, and the shoals are located by watchers or "huers" stationed on the cliffs, who detect them by the reddish tinge which they give to the water. The immature pilchards are shipped to the Mediterranean, to be reshipped as sardines. The canned pilchards of commerce are an almost similar kind found off the Californian coast.

Pilcomayo. River of central S. America, the chief tributary of the Paraguay. It rises in the S. of Bolivia and flows in a S.E. direction, uniting with the Paraguay near Asunción. It traverses the Gran Chaco (*q.v.*), and forms part of the boundary between Argentina and Paraguay. The principal affluents are the Pilaya and Paspaya. Its length is about 1,300 m.

Pile (Lat. *pilum*, javelin). In heraldry, a wedge-shaped charge, borne pendant from the top of the shield, the point ending a short distance from the base. *See* Heraldry colour plate.

Pile (Lat. *pila*, pillar). In electricity, a voltaic or galvanic dry battery. There are several types, of which Zamboni's dry pile is illustrative. This consists of many paper disks with a coating of tin or silver on one side, and binocide of manganese on the other. Many hundreds or even thousands of these disks may be piled and clamped together by two metallic rods which serve as terminals.

Pile, **ATOMIC**. A device for obtaining a continuous supply of energy from atomic disintegration, which, in the case of uranium 235, may be initiated by slow neutrons. In the process of fission, from one to three neutrons may be released, and these in turn will be able to produce further fission, and so start a "chain" reaction. Rate of transformation may be controlled by inserting rods of cadmium and boron steel, which retard the reaction by their large absorption for thermal neutrons.

Pile, **SIR FREDERICK ALFRED** (b. 1884). British soldier. Born Sept. 14, 1884, he was commissioned in the R.A. in 1904, and served throughout the First Great War. He was promoted col. in 1928 on appointment as assistant director of mechanization at the War office.



Decorated pilaster on an Adam building in the Adelphi, London



Fuller Pilch, English cricketer



Pilatus, Switzerland. The summit of the mountain showing cars of the mountain rly. On the right is seen Lake Lucerne

In 1931 he succeeded to a baronetcy. In 1937 he was made G.O.C. 1st A.A. brigade, T.A., with promotion to major-gen., and in 1939 G.O.C.-in-C. A.A. Command. A general from 1941, Pile retired from the army in 1945, and as director-general, ministry of Works, was to have put through the housing programme, but he relinquished the appointment within a period of six months. He was the author of Ack-Ack (1949), also of the article Anti-Aircraft Command in this Encyclopedia.

Pile Driving. The customary method of providing support in soft or submerged ground for bridges, piers, jetties, and foundations. The piles may project above ground and be part of the superstructure; or be completely embedded and act merely as rigid supports. Piles may be of timber, iron and steel, or concrete. Timber piles are usually of pitch pine, oak, greenheart, or Tasmanian gum, and are sharpened at the lower end and shod with a pointed steel shoe (see Fig. 1). The tops are ringed to prevent splitting.

Steel and iron are used in two forms for piling—interlocking sheet piling, and screw piles. Sheet piling forms a continuous barrier, e.g. a cofferdam or a retaining wall. Steel sheets are specially designed with vertical edges forming interlocking joints. Screw piles are of



Pile-Dwelling. A Malayan village composed of pile dwellings on the banks of the Belawan river, Sumatra

two types: either a hollow cast-iron barrel with a bolted joint similar to a cast-iron pipe with an unusually thick skin, or a solid steel bar. The former, frequently used for pier construction, has the advantage of the resistance offered by cast-iron to corrosion. The solid steel pile bar is frequently used, with diameter of about 6 ins.; attached to it are cast-iron helical screws. These piles are screwed by a capstan.

Concrete piles may be either pre-cast or cast *in situ*. The former are usually of square section, designed to withstand the stresses due to handling, driving, and load carrying, and consist of steel vertical rods, suitably bound horizontally and of sufficient cross-sectional area, embedded in the concrete. The lower end of the pile is pointed and has a cast-iron shoe.

With piles cast *in situ*, a steel tube or casing is driven to the requisite depth. The casing is blocked at its lower end, and when in place is filled with successive charges of concrete, each highly compressed and forced outwards by blows from a heavy drop-hammer while the casing is being withdrawn. If reinforcement is required, it is prepared in advance in the form of a circular cage; this is lowered into the casing, and the hammer works inside the cage.

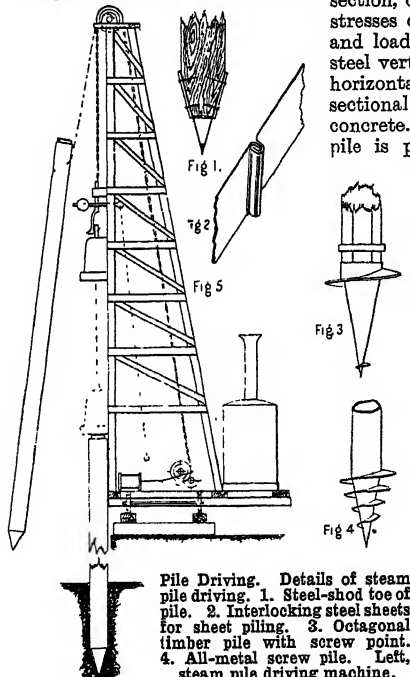
Pre-cast concrete and steel sheet piles are driven by allowing a

heavy iron ram, known as a monkey, to fall repeatedly on the pile head. The ram is raised by a rope passing over a pulley at the top of a frame, by hand winch or steam or Diesel power, and tripped automatically or by a hand-controlled trigger. Driving is continued until a specific drop is reached or the entry per blow diminishes to a specified figure, known as the set. From a knowledge of the set, the nature of the ground, and the weight and drop of the monkey, the probable bearing capacity of the pile, expressed as a load in tons, can be evaluated from formulae.

J. Kennard, M.Inst.C.E.

Pile-Dwelling. Primitive habitation built on piles. In the Neolithic and early metallic ages the palafitte type was widespread in central Europe. In England, pile-foundations have been found at Walbrook, London; Barton Mere, Suffolk; and Pickering, Yorks. Island strongholds of the fascine type—traceable in Holderness, at Llangorse, Brecknockshire, and in Glastonbury lake-villages—are numerous in Scotland and Ireland. In Bosnia pile-villages were erected along the Danube tributaries during the period from the Neolithic to the early Iron age.

Pile-construction survives in every continent. Pile-houses, observed by Amerigo Vespucci in the Maracaibo Gulf in 1499—whence the name Venezuela, little Venice—are still erected in the Caribbean lagoons. In Florida they are built on flood-land. The use of pile-granaries, even when the dwellings are on the ground level, is widespread in Africa, and occurs in other parts of the world. See Lake-dwelling.



Pile Driving. Details of steam pile driving. 1. Steel-shod toe of pile. 2. Interlocking steel sheets for sheet piling. 3. Octagonal timber pile with screw point. 4. All-metal screw pile. Left, steam pile driving machine.

Pile Fabric. Textile distinguished by the hair (Lat. *pilus*) or fibre left standing upon the surface. Pile can be produced in cloth finishing by breaking or tearing out fibre from the threads of the structure, or may be created in weaving. The pile of a blanket is an example of the former, and that of a velvet of the latter. Woven pile exists first as a loop and is left as such in "terry" goods. The loops may be cut as in plain velvet, the fibres of the yarn being opened out to form a dense cover. As in some figured velvets, cut and loop pile exist in the same fabric, forming regular designs. Plush is a long-piled velvet, and imitation furs made by weaving or knitting are pile fabrics.

Piles. Dilatations of veins in the mucous membrane of the rectum. See Haemorrhoids.

Pilewort (*Ranunculus ficaria*) OR LESSER Celandine. Perennial herb, one of the family Ranunculaceae. It is a native of Europe, W.



Pilewort. Flowers and leaves of the Lesser Celandine

Asia, and N. Africa. The root-fibres develop into a bunch of small tubers resembling on a very small scale those of the dahlia. The long-stalked heart-shaped leaves appear by copse and hedgerow very early in the year, and are soon followed by the bright golden flowers. Though of the same genus as the buttercups, the flowers are more starry than cup-shaped, the petals spreading. The fruits are nutlets (achenes), and are furnished with minute oily food-bodies (elaiosomes). These are eaten by ants, which thus assist in the distribution of the species by carrying the seeds away and dropping them after removal of the food-bodies.

Pilgrim (Lat. *peregrinus*, foreign) One who from religious motives journeys to visit some place considered sacred, as the scenes connected with the life of Christ or the tomb of a saint. Pilgrimages, made often for the cure of sickness or in thanksgiving for cure, are common in the histories of most important religions.

Examples are the pilgrimages of the Jews to Jerusalem during great festivals; of the ancient Greeks to the shrines of Apollo at Delphi, Diana at Ephesus, etc.; of the Indian sects to the shrines of Rama and Krishna; of Buddhists to the scenes of Gautama's life; and of Mahomedans to Mecca.

Among Christians the practice was not unusual as early as the close of the second century. The first notable instance on record is that of Alexander, the friend of Origen, who, in 212, "made a journey to Jerusalem for the sake of prayer and investigation of the places." But it was the visit of S. Helena, the mother of Constantine, to Jerusalem in 326, when she is supposed to have discovered the Holy Sepulchre and the relics of the Cross, that gave the great impulse to the practice of pilgrimage which reached such vast development in the Middle Ages.

Next after the Holy Land, the tombs of the Apostles at Rome became the great centre of pilgrimage. Pilgrims also visited the tomb of S. Thomas in India, that of S. John at Ephesus, Mt. Sinai, and the shrine of S. Martin at Tours. As early as the 7th century, laws were made giving special protection to pilgrims on their journeys; and Charlemagne in 796 exempted pilgrims from tolls. Pilgrims very commonly wore scallop shells as badges, though this was more correctly restricted to those who had visited the shrine of S. James at Compostella. In the Middle Ages the practice of pilgrimages became much abused, and a class of professional pilgrims arose, no better than tramps and mendicants, who led a wandering life and subsisted on charity. The custom died down in the Renaissance period; but still survives locally to some extent, e.g. at Lourdes in the S. of France. In Great Britain the shrine of S. Thomas Becket at Canterbury, of S. Alban at St. Albans, and of Our Lady of Walsingham were noted centres of pilgrimage, among many others. See Lourdes; Palmer; consult also Pilgrimages to S. Mary of Walsingham and S. Thomas of Canterbury, D. Erasmus, trans. J. G. Nichols, 1849; Scudamore, in Dict. of Christian Antiquities, W. Smith and S. Cheetham, 1893; Bede Jarrett, in Catholic Encyclopaedia, 1907-12.

Pilgrimage of Grace. Name given to a rising which took place in the N. of England in 1536 and 1537. The suppression of the smaller monasteries, unemployment caused by the extension of sheep-farming, and other grievances, led to an insurrectionary move-

ment in Lincolnshire, which soon spread to Yorkshire. Under Robert Aske, Lord Darcy, and Sir John Constable, the rebels, estimated at 30,000, entered York, their standard being a banner displaying the five wounds of Christ. They asked for the restoration of the religious houses, the removal of Cromwell from the privy council, and the deprivation of heretic bishops. Marching S. to Doncaster, they met the duke of Norfolk with a royal army by the river Don, and negotiations were begun, for Norfolk was too weak to fight. In the king's name he promised the rebels a free pardon and a parliament at York, and they dispersed.

Nothing being done to carry out these promises, insurrection broke out again in Cumberland and Westmorland. Henry VIII thereupon ordered the arrest of the leaders of the original rising, and, with four abbots and several other laymen, Aske, Darcy, and Constable were executed for treason. Instead of the promised parliament a Council of the North was established at York. See Aske, Robert.

Pilgrim Fathers, THE. Term applied to the English founders of Plymouth Colony, Massachusetts, in 1620. They belonged to the church founded by John Robinson at Leyden, in Holland. Seeking religious liberty, they had separated from the established Church in England, but while well treated in Holland, desired to retain their native language and customs.

Obtaining from the Virginia company a grant of land in New Jersey, and a promise, obtained by Sir Edwin Sandys from the king, that their freedom to worship as they pleased should not be interfered with, they set sail from Plymouth in the Mayflower, in all 78 men and 24 women, Sept. 6, 1620. By stress of weather they were forced to land, Dec. 21, on the coast of Massachusetts, far S. of the territory granted to them, and here they founded Plymouth Colony. The tercentenary of their sailing was commemorated on an extensive scale in England, Holland, and the U.S.A. in 1920, notably at Southampton. The Massachusetts Bay Colony, founded by English Puritans in 1629-30, and Plymouth Colony were united in 1691. The Pilgrim Fathers' Memorial Church in New Kent Road, London, was enlarged in 1856 by Americans in memory of Southwark men who sailed in the Mayflower. See Jordans; Mayflower, The; Robinson, John; Sandys, Edwin; Scrooby.

Bibliography. History of the Puritans in England and the Pilgrim Fathers, W. H. Stowell and D.



Pilgrim's Progress. Characters in John Bunyan's famous allegory, depicted by Fred Barnard. Left to right: The Man with the Muck-rake; Mr. Worldly Wiseman; Giant Despair

By courtesy of A. and C. Black



Wilson, 1849; Story of the Pilgrim Fathers, 1606-23, E. Arber, 1897; The England and Holland of the Pilgrims, H. M. and M. Dexter, 1906; The Pilgrims and Their History, R. G. Usher, 1918; The Pilgrim Fathers of New England, J. Brown, 4th ed. 1920; Saints and Strangers, G. F. Willson, 1947.

Pilgrims, THE. Anglo-American dining club. It has two branches, one founded in 1902 in London and the other in 1903 in New York, and exists to promote good feeling between the two peoples. A well-established tradition is that each new U.S. ambassador to the U.K. makes his first public speech in that capacity to the Pilgrims. The Pilgrims sponsored the proposal to erect a statue in London to F. D. Roosevelt. The offices in London are at the Savoy Hotel, W.C.2.

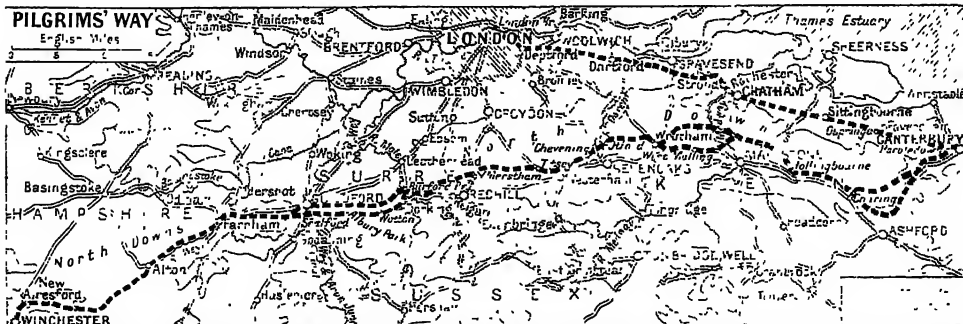
Pilgrim's Progress, THE. Religious allegory by John Bunyan (*q.v.*). The first part, which describes the adventures of Christian and Hopeful on their way from the City of Destruction to the Celestial City, was written in Bed-

ford gaol and first published in 1678. The second and inferior part concerned the journey Heavenwards of Christians, Christian's wife, her four sons, and her friend Mercy, was written at Elstow, and first published in 1684. A host of subordinate characters have their purposes clearly indicated by their names, like Evangelist, Great-heart, Mr. Worldly Wiseman, Giant Despair; and the route of Christian's journey is similarly shown in such places as the Slough of Despond, the Valley of Humiliation, Vanity Fair.

There is much theological disquisition, but for straightforward narrative Bunyan modelled his style upon that of the Bible. No book except the latter has been more widely circulated; six editions came out within a few years, and there are perfect copies of the first in the British Museum and the Rylands Library, Manchester.

Pilgrims' Way, THE. Track along which pilgrims from the W. travelled through Winchester to visit Becket's shrine at Canterbury. Of its 120 m., portions are

traceable over 72 m., mainly along the scarp of the N. Downs, by way of Alresford, Farnham, Shalford, Albury Park, Wotton, Burford Bridge, Merstham, Titsey, Chevening, Otford, Wrotham, West Malling, Hollingbourne, and Charing. Folk names, such as Beggars' Lane, Farthing Copse, and Pray Meadows, survive; and several churches along the Way, Seale, S. Martha's (properly S. Martyr's), and Gatton, were of pilgrim origin. The Way, which is doubled in places and in parts notable for its yew trees, followed a prehistoric track, strewn with many remains. With the exception of some 12 m. between Dartford and Strood, Chaucer's Pilgrims' Way, from London to Canterbury, 56 m., followed the modern Dover Road, touching Deptford, Dartford, Rochester, Chatham, Sittingbourne, Ospringe, and Harbledown. *See* Becket; Canterbury; Chaucer; *consult* The Canterbury Pilgrimages, H. S. Ward, 1904; The Old Road, H. Belloc, new ed. 1911; The Pilgrims' Way, J. Cartwright, 1911.

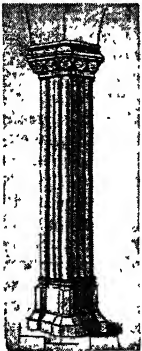


Pilgrims' Way. Conjectural routes followed by the pilgrims from Winchester to Becket's shrine at Canterbury, and that taken by similar pilgrims from London, as described by Chaucer

Pilgrim Trust. Fund established by the American millionaire E. S. Harkness (1874-1940) for the cultural benefit of Great Britain. A sum of £25,000 was made available in 1940 for the encouragement of the arts; concerts by the London Philharmonic and London Symphony orchestras were financed, and grants voted to the national federation of women's institutes and the rural music schools council. The Pilgrim Trust and the Carnegie Trust (*q.v.*) together approached the Treasury and the board of Education with a scheme which led to the foundation of the Council for the Encouragement of Music and the Arts (*see* Arts Council). The trust purchased on behalf of the Royal Society the manor house at Woolsthorpe in which Newton was born, together with his library of 858 volumes.

Pilibhit. District of the Uttar union of India, in the Rohilkhand division, adjacent to Nepal. Its area is 1,353 sq. m. The town of the same name is a rly. junction. Pop. dist., 490,718; town, 35,000.

Pillar. In architecture, an irregular column, i.e. one not constructed in accordance with the proportions of the recognized orders. The term is loosely applied also to any disengaged column that does not act as a structural support, e.g. a vertical monolith or memorial column, such as Pompey's Pillar, Alexandria. The term may be applied to any material welded together in rough columnar formation. Pillarsaints,



Pillar in architecture

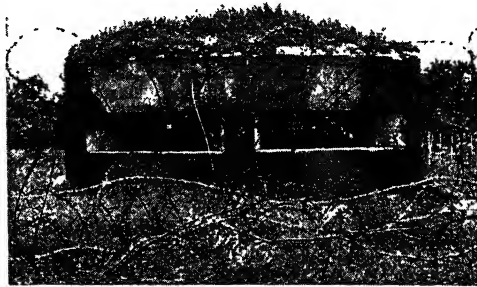
or Stylites, among whom S. Simeon Stylites is prominent, is a term sometimes used for hermits who made a home on the top of a pillar in the open air.

Pillars of Society. Social drama by Ibsen. Published in 1877, it stresses the need of a society which should give ample opportunity for the unrestricted growth of the individual. It was translated into English by William Archer, and performed at the Opéra Comique, London, 1889. Revivals included one at the Royalty Theatre, 1926.

Pillar-Worship. The ritual expression of reverence for natural pillar-shaped objects, especially of

stone, and artificial upright structures of similar form. In the Mediterranean basin sacred pillars were erected by Neolithic peoples, often in association with tree-worship (*q.v.*). Basalt pillars are venerated in negro Africa. *See* Hermae; Menhir; Obelisk.

Pill-box. Popular name for a strongpoint, or machine-gun nest, as first used by the Germans on the



Pill-box. A machine-gun post in a concrete pill-box at an R.A.F. bombing station - British Official

W. front in the First Great War. It was a loop-holed circular turret of armour-plate or a small concrete blockhouse containing infantry with machine-guns. Pill-boxes were erected at strategic points throughout England during the danger of invasion in 1940, and were used by the Germans in Italy, but had no place in the mobile operations which characterised the fighting later in the Second Great War. A pill-box should be distinguished from a bunker (*q.v.*).

Pillion. Originally a pack saddle, a cloth put under a rustic saddle when a woman rode on horseback. Today the term implies the seat on a motor cycle behind the driver. In the U.K. only one passenger, sitting astride, may be carried on a motor cycle; the maximum penalty against a driver for a breach of this regulation is a fine of £5 (£10 later convictions). A motor cyclist holding a "learner's" licence may carry as pillion passenger only somebody who has held a full licence for two years or has passed the driving test.

Pillory (Old Fr. *pilori*, perhaps from Lat. *speculatorium*, a lookout). Instrument of punishment. It consisted of a post surmounted

by a wooden frame with holes through which the head and hands of the culprit were thrust, and fastened to which he was exposed to public contumely for a specified time.

In England, where variations of the device were of old institution, the Statute of the Pillory, 1266, ordained its use as punishment for forestallers and regrators, users of false weights, perjurers, and forgers. After 1637 it became the usual punishment for press offences, such as printing books without licence and libelling the government, with results not always contemplated by the authorities; e.g. Defoe received a popular ovation when pilloried in 1703 for his

famous plea for toleration, *The Shortest Way with the Dissenters*. Others were pelted with garbage. In 1816 its use was restricted to punishment for perjury and subornation, perjurers being still liable to have their ears nailed to the pillory; and in 1837 it was abolished, having last been used June 22, 1830, for the punishment of Peter James Bossy, convicted of perjury. The pillory was used in Germany, in France as late as 1840, and in the U.S.A. until 1839. *See* Torture.

Pillow Lace. Lace made by hand with the aid of a straw-stuffed leather pillow. The design is traced upon parchment attached to the top of the pillow. Pins are inserted at the necessary points of the design, and the worker, using thread wound upon little bobbins, forms



Pillory. Daniel Defoe standing in the pillory at Temple Bar, London. From the picture by E. Crowe

the pattern by twisting or plaiting two or more threads together. Pillow lace is made without any foundation of fabric, and is composed of twisted and plaited thread. *See* Lace.

Pillow Lava. Type of lava which appears to be composed of a pile of pillow or sack-like masses varying from several inches to several feet long. These are commonly basaltic in composition, and develop this peculiar structure when poured out under water. The individual pillows have a tough chilled skin, and the rock inside is either more coarsely crystalline or is filled with steam holes. Pillows were observed developing on an underwater flow by Tempest Anderson. Good examples in Great Britain of ancient pillow lavas are at Pentire Point, Cornwall, and Tayvallich, Argyleshire.

Pillwort or **PEPPER-GRASS** (*Pilularia globulifera*). Perennial herb of the family Marsileaceae. It



Pillwort, showing on the left the globular spore capsules

is a native of Europe N. of the Alps. It is one of the water-ferns, but has a closer superficial resemblance to a delicate grass than to a fern. Its habitat is the margin of ponds and lakes, and ground that is inundated in winter. The creeping rootstock is a mere thread from which the slender bright green fronds unroll. The spores are produced in rough-coated globular capsules at the base of the fronds.

Pilniak, BORIS ANDREYEVICH (b. 1894). Russian writer. His real name was Vogou, and he became known during the 1920s for his descriptions of the Russian countryside and strong, psychological studies of diverse types. Several of his novels and short stories were translated into English. The best-known included *The Naked Year*; *The Red Tree*; *The Volga Flows into the Caspian Sea*; *Machines and Wolves*; *Tales of the Wilderness*.

Pilocarpine. Alkaloid, a white crystalline powder, obtained from the leaves of jaborandi or *Pilocarpus microphyllus* and other species. It is used in medicine to stimulate sweating, particularly in Bright's disease.

Pilot. Person who navigates vessels. A pilot is a person taken on board a vessel at any particular place for the purpose of conducting a ship through a river, road, or channel, or from or into a port. Pilotage was formerly governed by the Merchant Shipping Act, 1894, but the position was very irregular. As a result of a board of Trade inquiry, 1913, the system was reorganized by the Pilotage Act, which established a separate pilotage order for each district. These orders appointed a pilotage authority, which could licence pilots in its district. Trinity House is the pilotage authority for London. The master or mate of a ship may be granted a pilotage certificate entitling him to pilot his own ship. A passenger ship must, with certain exceptions, be piloted by a licensed pilot. Other ships are not, except in a compulsory pilotage district, required to be in charge of a licensed pilot. It is an offence for an unlicensed person to act as a pilot if a licensed pilot has offered his services. *See* Navigation.

Pilot. In aeronautics, one qualified to control an aircraft in flight. There are certain recognized standard tests for pilots of aircraft. Thus the Fédération Aéronautique Internationale, represented in Great Britain by the Royal Aero Club, has laid down tests for the pilots of free balloons, airships, and aeroplanes. Without having passed these tests no pilot is eligible for any sporting competition held under the auspices of the F.A.I. or any of its associated bodies. Under the Air Navigation Acts no pilot may fly outside the confines of an aerodrome without passing tests similar to, but somewhat extended from, those laid down by the F.A.I. In Great Britain, pilots of commercial aircraft have to pass ministry of civil aviation standards of health and professional ability before being qualified to fly "for hire or reward." Large air liners carry a first and second pilot. Non-commissioned pilots in the R.A.F. held the rank of sergeant, flight-sergeant, or warrant officer until 1945, when new ranks were introduced—master pilot, and aircrew I-IV. The chevrons on the upper sleeve were replaced by new

badges worn above the cuff. *See* Royal Air Force.

Pilot Fish (*Naucrastes ductor*). Marine fish, nearly related to the horse mackerel. It is about a foot



Pilot Fish. Marine fish related to the horse mackerel

long and of a bluish colour with dark transverse stripes. It is common in the tropic seas and often accompanies ships, whence arose the old notion that it acted as a pilot and indicated the proximity of land. It also frequents the company of sharks.

Pilotless Plane. An aircraft which becomes airborne and flies a pre-set course without a human pilot. Course is kept by an automatic pilot and direction and duration of flight may be controlled by radio transmission from a land station or from another aircraft. Pilotless planes, Queen Bees and other types, are used by the British army and navy for target practice. The flying bomb (*g.v.*) developed by the Germans in the Second Great War was a pilotless plane which flew on a gyroscope-set course, but its flight was not controlled. In 1947 an American Skymaster flew the Atlantic without a pilot. *See* Automatic Pilot.

Pilot Officer. Lowest commissioned rank in the R.A.F. Established in 1918, it is equivalent to that of a subaltern in the army and a sub-lieutenant in the navy. It is not restricted to aircrew, but is also held by ground personnel, including the R.A.F. Regiment. The insignia is a single ring worn on the sleeve or epaulette. *See* Royal Air Force.

Pilot Snake. Harmless N. American reptile. Common in the middle states of the U.S.A., it is black or dark brown above, spotted with darker shades. It is a little lighter in shade underneath. The snake is remarkable for its extraordinary quietness when captured and the ease with which it can be tamed. It lives mainly in the forests, and feeds chiefly on birds, mice, and other small animals. The name is also given to the copperhead and fox snakes. *See* Snake.

Pilot Whale. *See* Ca'ing.

Piloty, KARL THEODOR VON (1826-86). German painter, born at Munich, Oct. 1, 1826. In 1854 he painted for the Maximilianeum

a picture of the Elector Maximilian adhering to the Catholic League in 1609. This work established him as an historical painter of the new realistic school, and he became a professor of the Munich academy. His *Murder of Wallenstein*, 1864, is a good example of his treatment.



Karl von Piloty,
German painter

died July 21, 1886. His brother, Ferdinand (1828-95), was known as an illustrator of the works of Shakespeare and Schiller. *Prom. Piloh-ty.*

Pilsen OR PLZEN. Town of Czechoslovakia, in Bohemia. It is 52 m. W.S.W. of Prague at the confluence of the Mies and Radbuza and is an important rly. junction. S. Bartholomew's, a 13th century edifice, has a notable spire 335 ft. high. The Renaissance town hall contains the banqueting hall where Wallenstein received the oath of fealty from his generals. Pilsner lager is produced in the municipal brewery. The first printing press in Bohemia was established in Pilsen. Near here is Skoda (*q.v.*). Pilsen was bombed by Allied aircraft during the Second Great War, and captured from the Germans by armoured units of the U.S. 3rd army, May 6, 1945. Pop. 122,753. *See* Czechoslovakia.

Pilsudski, JOSEPH CLEMENS (1867-1935). Polish soldier and statesman. He was born at Zulov, near Vilna, Dec. 5, 1867, and studied medicine at Kharkov university, being expelled for taking part in a meeting of revolutionary students. Arrested by the Russians in 1887, he was exiled to Siberia for five years. On his release he settled at Lodz, joined the Socialist party, edited *The Worker*, a clandestine newspaper, and was again imprisoned, escaping to Cracow in 1901 and forming a Polish legion.



Joseph Pilsudski,
Polish soldier

At the outbreak of the First Great War, Pilsudski invaded Russia at the head of his legion, Aug. 6, 1914. After the Austro-German conquest of Russian Poland he was appointed to the

Polish council of state, but soon resigned. Accused of fomenting opposition to Germany, he was imprisoned at Magdeburg, 1917-18. Liberated by the armistice, Pilsudski became president of the newly-proclaimed Polish republic, 1919, and was given the rank of marshal. Fighting against the Bolshevik army in 1920, he advanced to Kiev, but was driven back to Warsaw. He resigned his post as head of the state in 1921 and as chief of the general staff in 1923; but in 1926 he led a revolt that overthrew the government, and was nominated president, only to decline the honour. As minister of war, and shortly afterwards as premier, he reformed the constitution until it became a thinly disguised dictatorship. In 1928 he resigned but was again premier for a few months in 1930; he remained minister of war and continued in effect as ruler of Poland until his death, May 12, 1935. *Consult* Lives, R. Landau, 1931; E. J. Patterson, 1935; Reddaway, 1939.

Piltown Skull. Fossil skull of the oldest known European race with distinct human traits; the skull, though thick, had a large brain capacity. Its fragments were discovered by Charles Dawson (d. 1916) in Pleistocene gravels at Piltown, Sussex, from 1912 onwards. An outjutting and chinless jaw found near by was long regarded as belonging to a primitive ape and not to the human skull. But in 1949 a S. African palaeontologist, Robert Broom, declared his opinion that both skull and jaw were human, and that the Piltown man (*Eoanthropus*) was a type parallel to, but different from, *Homo sapiens*. At the same time K. P. Oakley, of the British Museum, reported that chemical tests placed the age of both skull and jaw at no more than 100,000 years, thus suggesting that *Eoanthropus* disappeared during the last ice age.

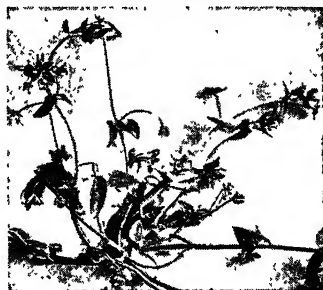
Pima. American Indian tribe in the U.S.A. and Mexico. Their number has been estimated at about 4,000 in the U.S.A., mainly in Arizona, and about 7,500 in Mexico. They occupy nearly the whole W. coast and Sierra Madre region of Mexico and Arizona from the Gila river S. into Jalisco. In 1751 they destroyed all Spanish settlements in their country. They now chiefly reside in the Gila river and Salt river reservations, Arizona. *See* Sonoran.

Pimento (*Sp. pimienta*). Genus of tropical American trees belonging to the family Myrtaceae. They bear cymes of small flowers and

coriaceous leaves. The chief species are *Pimenta officinalis*, the pimento bush, and *P. acris*, the wild clove or black cinnamon tree. The chief use of pimento is as a spice. The oil is used in medicine in the same way as cloves, and in perfumery. The well-known bay-rum toilet preparation is sometimes scented with *P. acris*. *See* Allspice; Cinnamon; Pepper.

Pimlico. Dist. of London between the Thames, to the E. and S., Chelsea, to the W., and Belgravia and Victoria Street, to the N. Pimlico Road links Royal Hospital Road with Buckingham Palace Road. First mentioned in the early part of the 17th century and notable for its ales, Pimlico is said to derive its name from a house of popular resort resembling one of the same name at Hoxton, called after its Italian proprietor. Victoria Station is in the district, which is in the city of Westminster. Much of the land is owned by the duke of Westminster. In the years preceding the Second Great War, many slum houses were pulled down and replaced by a model cottage estate. Dolphin Square, built on the site of a Royal Ordnance factory, consists of huge blocks of residential flats. *See* London.

Pimpernel (*Med. Lat. pipinella*) OR POOR MAN'S WEATHER-GLASS (*Anagallis arvensis*). Annual



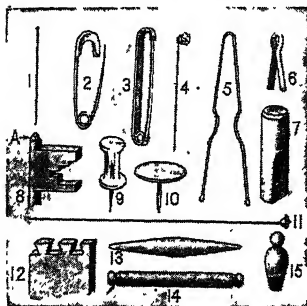
Pimpernel. Leaves, stalks, and flowers of the scarlet pimpernel

herb of the family Primulaceae. It is a native of Europe, Asia, and N. Africa. The slender square stem mostly lies along the ground, the branches being more erect. Opposite, stalkless leaves are oval or lance-shaped. The bright scarlet flowers open only in the earlier part of the day, and in clear weather. The fruit is a globular capsule containing many three-sided seeds. One variety has bright blue flowers.

Pin. Device for fastening two or more objects together. The most common type, the domestic pin used for fastening textiles or paper, consists of a short length of wire

pointed at one end and having a rounded head at the other. The firing pin of a rifle or machine-gun consists of a thin steel rod pointed at one end and held by spring-tension to the rear of the breech by a bent which engages with the sear of the trigger. When the trigger is pulled, the pin's sear is disengaged and it moves forward to strike the cap of the cartridge which in turn fires the charge and discharges the bullet. The firing pin is withdrawn to the rear by means of the bolt, so re-engaging bent and sear, and also opens the breech for ejection of the spent cartridge case. The firing pin was invented in 1808.

The earliest forms of pins were made of bone or bronze, and specimens of these are found in Egyptian and Roman remains. Pins



Pin. Various kinds for various purposes: 1, ordinary; 2, safety; 3, tie safety; 4, tie; 5, hair; 6, split; 7, cotter; 8, key (A); 9, 10, drawing; 11, hat; 12, dovetail; 13, belaying; 14, rolling; 15, ninepin

of iron wire were made in England in the 15th century, but the greater part of the pin trade was in the hands of France till the 17th century, when their manufacture was taken up in London, Birmingham, and other places. The pins were all hand made, a length of wire being filed to a point, and the head made by twisting a piece of fine wire round the other end. Solid-headed pins were introduced in 1797, the head being moulded.

Iron, steel, and brass wire are used in modern pins. Correct lengths are cut from a reel of wire in the pin-making machine, the blank is held by a pair of nippers while the head is punched, the points ground by moving the pin across a circular file revolving at high speed, and the completed pin then falls into the receiving pans. The whole operation is automatic, the only attention the machine requires being the renewal of the reel of wire. Two to four hundred pins a minute are made by each ma-

chine. The pin sticking machine holds the pins in rows by their heads, and presses them into crinkled paper.

Safety pins are made on automatic machines which are fed with a continuous strip of metal on the one hand, and with pointed stems on the other. From the strip blanks are cut and these blanks are passed, one at a time, from tool to tool until, as formed caps, they lie in succession under the fastening tools. In a hopper where the pointed stems have been placed in bulk, a single stem is separated, raised, and carried mechanically to tools which form the head and the coil. The coiled stem is lifted away and pushed head and point into the cap lying beneath the fastening tools. The cap is pressed on to the head, and the completely formed pin thrown out of the machine.

In engineering a pin is a short length of metal wire or rod, often tapered, for inserting into a hole to hold one part to another, or to restrain movement. A wheel or pulley in light machinery may be secured to a spindle by a taper pin passing through a hole bored through the hub and coinciding with a hole bored through the spindle. Taper pins are sized by accepted standards, and the British Standards Institution issues specifications for them. A reamer with the standard taper and other dimensions is used to finish the holes for such pins. For light work, split pins are used, made from steel or other metal stock of such a shape that when doubled it forms an approximately cylindrical exterior. Other split pins are solid for the greater part of their length, and are split at the lower end.

Pin. Cask used by brewers. It holds $4\frac{1}{2}$ galls.; formerly a standard measure in England for ale.

Pina Cloth. Yellowish lawn fabric woven from the leaf fibre of the pineapple plant and allied species. It is made chiefly in the Philippine Islands, and is used for handkerchiefs, scarves, etc. In spite of its delicate appearance it is very strong.

Pinafore, H.M.S., OR THE LASS WHO LOVED A SAILOR. Comic opera written by W. S. Gilbert, with music by Arthur Sullivan. It was produced at the Opéra Comique, London, May 27, 1878, attaining a run of 700 performances, and was the first of the great popular successes of the Gilbert and Sullivan partnership. The scene is set on board ship, the characters are the ship's company,

together with the first lord of the Admiralty and his female relatives, and the music is nautical, often mock-Handelian. The most famous numbers are the first lord's song ("Now I am the ruler of the queen's navee") and that of the Pinafore's captain, with the refrain: "What, never? Well, hardly ever."

Pinar del Rio. Province and town of Cuba. The prov., which has an area of 5,206 sq. m. and a pop. of 364,338, produces the famous Vuelta Abajo tobacco, considered the best in the world for cigar making; also sugar, coffee, and fruit; and has lumber and cattle-rearing industries. On the S. slope of the Cordillera de los Organos is the Vuelta Abajo. The town, the capital of the prov., is situated 93 m. W. by S. of Havana, with which it communicates by rly. and by the central motor highway. Pop. 64,823.

Pinch, Tom. Character in Dickens's novel *Martin Chuzzlewit*. Plain and awkward in person, he is a lovable simpleton, completely deluded by the hypocrisy of Pecksniff (*q.v.*), to whom he acts as assistant. His sister, Ruth, is among the most attractive of the author's many "little," dainty, domesticated women.

Pinchbeck. Variety of brass. It was named after Christopher Pinchbeck (d. 1732), a London clockmaker, who is said to have discovered it, although there is no contemporary mention of the fact. His son, another Christopher Pinchbeck (d. 1783), was also a clockmaker who had a number of mechanical inventions to his credit.

The best pinchbeck is obtained by an alloy of copper 89 p.c. and zinc 11 p.c. to 93 copper and 7 zinc. Pinchbeck was at one time largely used for the manufacture of cheap jewelry and watch cases. It wore well when made of good material, and in old watches the inner cases, not exposed to much wear, are as bright and lustrous as they were a century ago. Pinchbeck rather unjustly became a synonym for sham and counterfeit. The material was superseded by "rolled gold" and "gold filled" material, in the best of which the outer surfaces are actually of gold.

Pinckney, CHARLES COTESWORTH (1746-1825). An American statesman. Born at Charleston, South Carolina, Feb. 25, 1746, he was educated in England at Westminster School and Christ Church, Oxford, studied law at the Middle Temple, and afterwards practised in his native town. After serving in the War of Independence, he

took part in the Constitutional Convention in 1787, and was responsible for the clause abolishing



C. C. Pinckney,
American statesman

religious tests as a qualification for office. He was one of the special envoys to France in what became known as the XYZ mission (q.v.). Pinckney was a supporter of slavery, a strong federalist, and twice an unsuccessful candidate for the presidency. He died at Charleston, Aug. 16, 1825.

Pindar (c. 522–443 B.C.). Greek lyric poet. He was born of a noble Dorian family near Thebes. The traditions of the family were musical, and Pindar is believed to have excelled in flute playing. His first poetical composition was a choral ode, written at 20 in celebration of the victory of a Thessalian youth at the Pythian games. He rose rapidly to fame, receiving commissions to write choral songs for special occasions from all parts of the Greek world, from democracies such as Athens and from tyrants such as Hiero of Syracuse in Sicily. He came to be regarded as the great national lyric poet of Greece, and after his death his memory was held in the utmost veneration. When the Spartans destroyed Thebes in the Peloponnesian War, the house of Pindar was spared, and the same honour was paid to his memory by Alexander when Thebes was again destroyed by the Macedonians.

Pindar wrote lyrics of many forms, including hymns to the gods, dancing songs, carnival songs, and dirges; but, except for fragments, all that have survived are his *epinikia*, or odes written in celebration of victories at the great national games of Greece. These are divided into four books according as the victories celebrated were at the Olympian, Pythian, Nemean, or Isthmian games. Not only is the language of the odes epic (with an admixture of Doric and Aeolic), but there is a background of epic legend. Not infrequently the poet

endeavours to inculcate a moral lesson. Much of the beauty of the odes is lost because the modern reader is unable to hear them in the magnificent setting of the festivals at which they were chanted. Yet even in the cold text the wonderful radiance and dazzling rapidity of Pindar remain. The metres, though to an untrained eye apparently irregular, conform to a definite system of prosody. The so-called Pindarics of Cowley, Dryden, and other lesser poets are prosodic absurdities, composed in ignorance of the fact that the Greek lyricist's odes were built up on a precise and accurate system. There is an excellent translation, with parallel text, by Sir J. E. Sandys in the Loeb Classical Library, 1915; and another by R. Lattimore, 1947. See Greek Literature; Ode; consult Pindar, F. D. Morice, 1879.

Pindar, PETER. Pseudonym of John Wolcott (1738–1819), British satirist. He was born at Dod-



Peter Pindar,
British satirist

brooke, Devon, and having qualified in medicine went to Jamaica and became physician-general of the island. Returning to England in 1773, he set up in practice in Cornwall, where his ideas of treatment scandalised his medical brethren, as did his remark that a physician could do little more than watch nature and "give her a shove on the back if

he sees her inclined to do right." In 1781 he gave up practice and came to London, where his satires and lampoons, witty but brutal and sometimes profane, on the Royal Academy, royalty, and other subjects, brought him great fame, though they are now completely forgotten, except for a few pointed aphorisms. Wolcott died Jan. 14, 1819.

Pindaris. Body of brigands and freebooters of all nations and religions of India. They carried on pillaging and marauding expeditions from headquarters in the Vindhya Hills, and in the opening years of the 19th century had become the

scourge of Central India. A Pindari invasion of the British possessions in the Deccan in 1815 brought matters to a head, and the forces of Hastings, the gov.-gen., surrounded the Pindari district in 1817, and crushed the brigand power.

Pind Dadan Khan. Town of the W. Punjab, Pakistan, in Jhelum dist. Situated 5 m. from the Salt Range and 1 m. from the Jhelum, it was founded in 1623 by Dadan Khan, and has considerable local trade, especially in salt. Population 15,000.

Pindemonte, IPPOLITO (1753–1828). An Italian poet. Born at Verona, he was educated at Modena, and at 24 went to Rome, where he became a member of the Arcadian Academy. As such, he undertook a translation of the *Odyssey*, and visited the various places associated with the legend of Ulysses. Having published a volume of poems in classic form, *Poesie Campestri*, in 1788, he travelled in Germany, France, and England. In 1807 he issued a fine poem in reply to Ugo Foscolo's *Sepolcri*, with the same title. His translation of the *Odyssey* into Italian blank verse was completed in 1822. He died at Verona, Nov. 18, 1828.

Pindus. Mt. range of N.W. Greece. Once the boundary between Epirus and Thessaly, it is the continuation S. of the Albanian Mountains and culminates in Veluchi, 7,600 ft.

Pine (*Pinus*). Genus of about 70 species of large evergreen trees, members of the family Coniferae, natives chiefly of the N. temperate regions and the mountains of the N. tropics. The branches form whorls, each whorl marking a season's growth. The lower branches are killed off by the upper ones depriving them of light. The evergreen leaves are needle-shaped, produced in clusters of 2 to 5. The simple flowers have no sepals or petals, and the males and females are on separate branches. The males are clustered in spikes at the base of new shoots and consist merely of scale-like stamens, each with two anther-bags filled with sulphur-coloured powdery pollen. The females are found near the tips of shoots in the form of round, scaly cones, each scale bearing a couple of seed eggs. After fertilisation by wind-borne pollen these develop into the hard woody pine-cones, in which the seeds do not ripen until the second or third year after their fertilisation.

For the production of their valuable soft timber (deal), pines are grown crowded together, in order to



Pindar, Greek lyric poet
From a bust in the Villa Albani, Rome



Pine. 1. Cluster pine. 2. Young cone of cluster pine. 3. Scotch pine. 4. Young cones of Scotch pine. 5. Cones of Austrian pine. 6. Austrian pine

discourage branch growth and increase the length and girth of the

trunk. The Scotch pine (*P. sylvestris*) of Europe and N. Asia is the only British species. It reproduces itself by self-sown seed on heaths and wastes, however poor the soil. Its growth in Britain is more rapid than in the N. of the Continent, and as a consequence the timber is coarse-grained and less durable than that imported from the Baltic region. It abounds in turpentine, and yields tar, pitch, and resin.

Other species of pine introduced and commonly grown in Britain include the Corsican P. (*P. laricio*) from Central and S. Europe, the Cluster P. (*P. pinaster*) from the Mediterranean region, and the Weymouth P. (*P. strobus*) from N. America. Others occur as ornamental trees in parks and large gardens. Pine timber is always in good demand, as it is the general utility wood of the builder for joists, flooring, doors, stairs, window-frames, etc., as well as for the ordinary purposes of the carpenter. Most of the exotic species may be reared easily from seed, and as they are mostly accustomed to grow naturally in poor or shallow soils, they

will thrive in most gardens. The best results are attained by sowing them where they are to remain as trees. See Coniferae; Forestry.

Pineal Gland (Fr. *pinéal*, like a pine-cone). Small body deeply situated in the brain. It is believed to represent morphologically the traces of a third eye, and in certain lizards part of the gland becomes developed into a structure resembling an eye, but covered with skin. Modern researches indicate that it may be a gland, the secretions of which are supposed to influence, particularly in early life, both the mental and physical growth.

Pineapple (*Ananas sativus*). Perennial herb of the family Bromeliaceae, a native of S. America. From the rootstock grows a cluster of long, thin-textured, but rigid sword-shaped leaves with sharp-toothed edges. From the centre of the leaf-cluster rises a short stout stem ending in a conical spike of

flowers surmounted by a crown of small, spiny leaves. The berries succeeding the flowers grow together into a juicy compound fruit—the pineapple. The plant was introduced to Europe in the 17th century, and grown in stove-houses, where fine fruit was often produced; but its extensive field cultivation in the W. Indies and the Azores supplied the markets with



Pineapple. Fruit arising from leaf cluster

an abundance of fine fruit, which has led to the gradual abandonment of stove cultivation.

Pineapples should be grown in pots in a hothouse, should be placed in a sunny position, and the pots plunged into a hotbed at a temperature from 65° to 75° F. The soil should consist of a thoroughly mixed compost of loam, decayed manure, and a little lime, or crushed bones or oyster shells. When established, the temperature may be allowed to drop 10° during winter. Water should be given freely in summer, when the temperature should be brought up to 90° to 90°, but sparingly during autumn and winter. A pineapple stock will yield a ripe fruit every eight months for a number of years. See Hawaiian Islands.

Pine Bluff. City of Arkansas, U.S.A., the co. seat of Jefferson co. It stands on the S. bank of the Arkansas river, 44 m. by rly. S.S.E. of Little Rock, and is served by rlys. Among its educational institutions is the Merrill Institute. Cotton and maize fields begin at the end of the city's wide streets, and cattle are raised. Pine Bluff was organized in 1832 and became a city in 1885. Pop. 21,290.

Pine Creek. Name of many streams and small towns in the U.S.A. In Pennsylvania one of these streams is a tributary of the Susquehanna, 100 m. in length. Its gorge, bounded by rock walls rising 800 ft., is known as the Grand Canyon of Pennsylvania. In Alaska and in the Yukon dist. of Canada there are such streams whence gold is obtained.

In the Northern Territory of Australia, Pine Creek is 146 m. by rly. S.E. of Darwin.

Pinega. River of the N. region of the R.S.F.S.R. It rises near Yarensk, flows N.W. towards Archangel, and discharges itself into the Northern Dvina, near Kholmogory. Its length is 350 m.

Pinene. Hydrocarbon ($C_{10}H_{16}$) of the terpene group. It is the chief constituent of oils distilled from resinous excretions of pine trees, such as turpentine. Pinene is a colourless liquid, which on keeping becomes resinified through the absorption of oxygen from the air. When hydrochloric acid gas is passed into pinene, the hydrochloride known as artificial camphor ($C_{10}H_{16}HCl$) is formed.

Pinero, Sir Arthur Wing (1855-1934). British dramatist. Born in London, May 24, 1855, he was an actor from 1874 to 1881. Then he achieved success as a dramatist with *The Squire*, and in

1885 wrote a farce, *The Magistrate*. Of his romantic pieces, *Sweet Lavender*, 1888, and *Trelawny of*

the Wells, 1895, were outstanding. With *The Second Mrs. Tanqueray*, 1893 (in which Mrs. Patrick Campbell made her début), Pinero became one of the most famous playwrights of his day, and until the First Great War his well-constructed social comedies were thoroughly representative of their time, e.g. *The Notorious Mrs. Ebbsmith*, 1895; *The Gay Lord Quex*, 1899; *His House in Order*, 1906; *Mid-Channel*, 1909. Later pieces included the fantasy, *The Enchanted Cottage*, 1922; *A Cold June*, 1932. Pinero was knighted in 1909, and died Nov. 23, 1934. Consult Sir A. P.'s *Plays and Players*, H. Fyfe, 1930; *Life and Letters*, W. D. Dunkel, 1943.

Pinerolo. City of Italy, in the prov. of Turin. It stands on the river Chisone, at the foot of the Alps, 24 m. by rly. S.W. of Turin. The chief buildings are the cathedral, dedicated to S. Donatus, and the palace, the successor of the famous castle. The city has manufactures of textiles, leather, paper, etc. Pinerolo was at one time one of the strongest places in Italy. It grew up around a castle which about 1190 was taken by the count of Savoy. A later count made it his capital and it remained a possession of the house of Savoy, save for short periods when it was in French hands. During one of these periods, early in the 17th century, the French greatly improved the fortifications. The castle is notable because in it Fouquet and the man in the iron mask were imprisoned.



Pink. Flowers of the sweet-smelling garden plant

Pinfold. Enclosure, or pound, in which strayed cattle are placed. See Potnd.

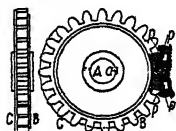
Ping-pong. Popular name, still frequently used in the U.S.A., for the game now more generally called Table Tennis (q.v.).

Pinguicula (Lat. *pinguis*, fat). Genus of perennial insectivorous herbs of the family Lentibulariaceae. They are natives of the N. temperate regions, the Andes, and the Antarctic zone. Four species grow in Great Britain, where they are known as butterworts (q.v.).

Ping-Yang. Less familiar name of the Korean seaport Heijo (q.v.).

Pinion. Commonly, a small spur- or cog-wheel which gears with a larger wheel, or a toothed rack. When,

to give additional strength, a thickness of metal or material is provided between the ends of the teeth, so that in side elevation the wheel appears circular, a pinion is said to be shrouded. The word is also used for any small wheel having teeth which gear with others on a larger wheel or piece of mechanism.



Pinion. Edge and front views of spin pinion. A. Eye; a. keyway. B. Shrouding to pitch line. C. Full shrouding, p. p'. Pitch lines

Pinite. A yellowish, micaceous alteration product of the rock-forming silicate, cordierite, crystals of which are very commonly replaced by fine aggregates of pinite and sericite (white mica), sometimes completely or along the margins and along cracks.

Pink (*Dianthus plumarius*). Tufted perennial herb of the family Caryophyllaceae. It is a native of Central and E. Europe, whence it was introduced to Britain in 1629. It has become naturalised on old walls in many places. It has slender, rounded, branching stems, 1 ft. high, swollen where the grasslike, glaucous leaves are given off in pairs. The rose-purple fragrant flowers have fringed petals.

Under cultivation it has given rise to numerous varieties, single and double, pure white, or variously spotted and variegated, which are classed as show or laced pinks, and border pinks. They succeed best in rich loam, to which for the production of fine flowers decomposed manure and leaf-mould are added. They are propagated by seeds and cuttings (pipings). These last are taken

in summer from the side-shoots, cleanly cut just below the leaf-joint. The lower leaves are removed carefully, and the pipings inserted in sandy soil in the shade. Large clumps may be divided and replanted in Sept.

Pinkerton, ALLAN (1819-84). American detective. Born in Glasgow, Scotland, Aug. 25, 1819, he emigrated to America in 1842, and immediately opened a detective agency in Chicago. In 1861 he was appointed to guard President Lincoln, and the same year inaugurated the federal secret service. He organized a band of men to protect employers against strike riots, and took a leading part in suppressing the Molly Maguires (q.v.). His agency was responsible for solving many sensational criminal cases, and under his sons, Robert Allan and William Allan, the agency became world-famous. He published *The Molly Maguires and the Detectives*, 1877; *Criminal Reminiscences*, 1878; *Thirty Years a Detective*, 1884. He died July 1, 1884. *Consult* The Pinkertons, R. W. Rowan, 1931.

Pinkerton, JOHN (1758-1826). Scottish historian. Born in Edinburgh, Feb. 17, 1758, he was trained for the law. His interests, however, were literary, and, having settled in Edinburgh, he collected and published some volumes of ballads. From that he turned to antiquarian and historical studies, which culminated in his *History of Scotland*, 1797. His other works include *Essay on Medals*, 1784; *Scottish Biographical Dictionary*, 1799; *Modern Geography*. He died March 10, 1826, and his *Literary Correspondence* was published in 1830.

Pink Eye. Term for horse influenza, first used in America. The first symptom of the disease is a red and swollen condition of the membranes of the eye. In human beings this is a mild form of conjunctivitis (q.v.).

Pinkie, BATTLE OF. Fought Sept. 10, 1547, between the English and the Scots. Somerset, the English protector, wished to unite the two countries by a marriage between Edward VI and Mary, and proposed a treaty to the Scots, which was refused. Somerset crossed the border with some 16,000 men and met a Scottish army, about 23,000 strong, drawn up behind the Esk, at Pinkie, near Musselburgh. The Scots crossed the river to seize some hills on the English left and won an early success. The English foot, however, with whom were some Italian

musketiers, did deadly work and the Scots were soon routed. Some 6,000 of them are said to have been killed.

Pinking. Cutting of eyelets or scallops in cloth. Fabrics for coffin linings are often pinked, and it was common at one time for private dressmakers to send material to the undertaker's to be pinked by the aid of the machine kept by such tradesmen; but pinking scissors are extensively used in the dressmaking trade.

Pinking. Sharp metallic knocking in an internal combustion engine. It may be caused by overheating, driving with the ignition too far advanced, too high compression, or by excessive carbon deposit. Pinking results in a falling off of the power developed, as too high compression causes the mixture in the cylinder to ignite prematurely. At the upper end of its stroke, the piston "chatters" from one cylinder wall to the other, as the pressure is reversed and acts on the crown of the piston. Excessive carbon in the mixture deposits carbon on the cylinder walls and results in uneven thrust. Some types of petrol contain a lead derivative to prevent pinking. *See* Knocking; Motor Vehicle.

Pink Root (*Spigelia marilandica*), WORM GRASS, OR INDIAN PINK. Perennial herb of the family



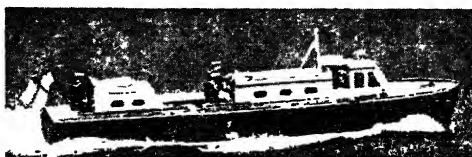
Pink Root. Leaves and funnel-shaped flowers. Inset, enlargement of flower

Loganiaceae. It is a native of N. America. The opposite, oval lance-shaped leaves are stalkless. The funnel-shaped flowers are red outside and yellow within, grouped on a one-sided spike. Leaves and roots yield spigeline, a powerful worm medicine.

Pin Money. Term used to describe an allowance of money given

to a woman for her own personal expenditure. The phrase originated in the 16th century when wives had a special allowance with which to buy pins, then very expensive.

Pinnace. One of a warship's boats. It may be propelled by



Pinnace, as used in the Royal Navy

oars, sail, steam, or motor. Most pinnaces are motor-driven. When oars alone are used, a pinnace is generally eight-oared and double-banked. The term applies to a light sailing-boat, frequently schooner-rigged, used as a tender. Sailing pinnaces often relied upon oars when the wind fell.

Pinner. Parish and village of Middlesex, England. It is 13 m. N.W. of London, on the Pin, a feeder of the Colne, and is served by London Transport and by main-line rlys. The cruciform church of S. John the Baptist, built on an earlier foundation in 1321, and restored 1879, has a fine Perpendicular tower, and a mural monument to the poet laureate, Henry J. Pyc. In a cottage in Pinner Wood, Bulwer-Lytton wrote *Eugene Aram*. Pinner Park, once forest land in the keeping of the abbots of Westminster, passed to S. Thomas's Hospital, London. Near the rly. station are the Commercial Travellers' Schools, opened 1856. The Queen's Head inn dates from 1705. At Headstone was a residence of the archbishops of Canterbury. Once a hamlet and chapelry of Harrow, Pinner was, by Edward III, granted a market, still held annually on the Wed. following Whitsun. Pop. est. 10,000.

Pinos, ISLA DE, OR ISLE OF PINES. Island in the West Indies. It lies about 36 m. S. of Cuba, of which it is a dependency, and has an area of 1,180 sq. m. Pineapples and tobacco are grown. Cattle rearing is carried on, and minerals, chiefly sulphur and marble, are worked. Santa Fé is the capital. It was discovered by Columbus in 1494, and was for long a buccaneer's stronghold. Pop. est. 4,000.

Pinsk. Town of White Russia S.S.R., in the region of the same name. It is situated 150 m. S.W. of Minsk, on the Pina, and the Brest-Bryansk rly. Here were brick and soap works, and tanneries. In the 15th century it belonged to

the princes of Kiev, then became independent, and after belonging to Lithuania and Poland, passed to Russia in 1795.

Pinsk was captured by the Germans on Sept. 16, 1915, during the Russian retreat from Brest Litovsk, and was in the area secured by Poland from Russia under the treaty of Riga, 1921. Occupied by Russia after the German-Soviet partition of Poland in Sept., 1939, Pinsk was captured by the Germans in June, 1941, during their invasion of Russia. It was recaptured by troops of the 1st White Russian army on July 14, 1944.

Pint. Measure of capacity. The English pint is both a liquid and a dry measure, is the eighth part of an imperial gallon, and contains 34.65925 cubic inches. The pint is subdivided into four gills, and two pints make a quart. The Scottish pint contains a little over three imperial pints, and the U.S.A. standard pint 28.875 cubic inches. In medicine a pint is equivalent to twenty fluid ounces. *See* Weights and Measures.

Pin-Table. Game popular in amusement arcades and bars. On a table, set in a frame under glass and sloping gently towards the player, are a number of holes; on the right is a narrow guide-way from which steel balls are shot one by one, by a piston working against a spring. The aim is to shoot each ball in such a way that, as it returns towards the bottom of the table under gravity, it is caught in one of the holes, each of which records an appropriate score. Pins or other obstacles are placed on the surface of the table to divert the ball. The game is a development of bagatelle (*q.v.*) and its variant Corinthian bagatelle. Pin-tables have been greatly elaborated: on some the contact of a ball with an obstacle illuminates an electric light, the score being shown on an illuminated screen. Usually it is necessary to insert a penny in a slot to release the balls for play.

Pintail Duck (*Anas acuta*). Wild duck, widely distributed over the N. hemisphere and a

winter migrant to British shores. It breeds in Scotland and the adjacent islands. Locally known as the sea-pheasant, it is easily recognized by its slender and graceful form, and long, pointed tail. It occurs in small flocks near the shore and feeds upon weeds, crustaceans, and insects.

Pinturicchio. BERNARDINO (1454-1513). An Italian painter. Bernardinodi Biagio, commonly known as Pinturicchio "the little painter," on account of his small stature, was born at Perugia, studied under Fiorenzo di Lorenzo, and worked in the Sistine Chapel, Rome, 1482. He subsequently visited Orvieto, Perugia, Spoleto, and Milan. At Siena he painted the Life of Aeneas Silvius (Pope Pius II) in the library. The Sistine Chapel and Borgia frescoes at the Vatican were his most successful works. His art deteriorated before his death, which took place at Siena, Dec. 11, 1513. *See* Ceiling.

Pinwell, GEORGE JOHN (1842-75). British painter and illustrator. Born in London, Dec. 26, 1842, he studied at the St. Martin's Lane academy and Heatherley's. He was elected A.R.W.S. in 1869, R.W.S. in 1870, and contributed many water-colours to the society's exhibitions; but he is best remembered by his black and white work in *Once a Week*, *Good Words*, and other journals during the revival of English book illustration in the 1860s. Died at Hampstead, Sept. 8, 1875. *See* Drawing.

Pinxton. Market town of Derbyshire, England. It is 6 m. S.W. of Mansfield, and is served by two rly. stations. By-products of coal, children's clothing, and saccharine packing provide industries. S. Helen's church, dating from the 13th century, was rebuilt c. 1750. Market day, Fri. Pop. 6,000.

Pinzon, VICENTE YAÑEZ (c. 1460-c. 1523). Spanish navigator. Born at Palos, he became a skilful mariner and commanded the Nina on Columbus's first voyage to America, 1492-93. In 1497 he reached the American mainland, and in 1499 discovered the coast of Brazil and the mouth of the Amazon. In 1505 he was made governor of Porto Rico. He went to sea again in 1508, and returned to Spain the next year with a cargo of gold. After 1523 nothing more is known of him.

Piombi (Ital., leads). Name given to a state prison in Venice. It was so called from being situated beneath the lead roof of the doge's palace, and the attic cells were used mostly for state prisoners. Of the inmates, Casanova and Silvio Pellico are the best known. *See* Venice.

Piombino. Former independent principality of N.W. Italy, now included in the prov. of Leghorn. Its area was 138 sq. m. Originally an imperial fief, it belonged from 1399 to 1603 to the Appiani family. It was taken by the French in 1801, and was given by Napoleon to his sister, wife of Prince Bacciocchi. In 1815 it passed to Tuscany and thus to Italy. The most interesting town in the old prov. is Populonia, the Etruscan Pupluna. Situated on a hill, the town is dominated by a medieval castle. It was a valuable port in Roman times when the iron from Elba was smelted there. *From* Peeom-beeno.

Piombino. Town and seaport of Italy, in the prov. of Leghorn. Situated on a promontory opposite the island of Elba, 8 m. by rly. S.W. of Campiglia Marittima, it is the port of embarkation for Elba. It has iron rolling mills.

Pioneer (Fr. *pionnier*, foot soldier, sapper). Word used for soldiers who prepared the way for the march of an army. They did this by clearing and making roads, and their duties included also the preparing of entrenchments, and bivouacs. From this use the word came to mean one who was first in any work of discovery, whether actually, as in unexplored forests, or figuratively, as a scientist.

In the British army a pioneer battalion is a body of troops who prepare positions, lines of communication, and defensive works for the use of combatant units. Until the First Great War pioneer duties in the British army were mainly carried out by Royal Engineers; in 1915, however, labour battalions were raised and became indispensable. In 1939 the Auxiliary Military Pioneer Corps, now the Royal Pioneer Corps, was raised for service in the Second Great War and later placed on the permanent establishment with regimental status.

Pioneer Health Centre, PECKHAM. Centre for the "study of the living structure of society." It began in 1926 when a small group, all under 30, acting under scientific guidance, took a small house in Peckham and invited families living near by to join as families



George Pinwell,
British painter



Pintail Duck. A winter migrant to Britain, it also breeds in Scotland

W. S. Berridge, F.Z.S.

(not as individuals) a health centre or family club. A small weekly subscription was charged, and the centre lasted for three years before it outgrew its premises. From this beginning the Pioneer Health Centre, opened in 1935, developed. Suspended during the Second Great War, it reopened in 1946, but was closed in 1950 for lack of funds. The centre, with 2,000 member-families, was, in the words of its organizers, "a locus in society from which the cultivation of the family—living cell or unit of society—can proceed and from which the family sustained in its own growth and development can spontaneously evolve as part of a larger whole—a living organized society." In addition to the usual and many other medico-social activities of a health centre, it catered for the leisure of every individual in all the member-families, i.e. for all age and all wage levels. The building included a gymnasium, a swimming bath, a theatre and concert hall, and a cafeteria. Periodical health overhaul for every member of member-families was the basis of the centre scheme. Consult The Peckham Experiment, I. H. Pearse and L. H. Crocker, 1943; Biologists in Search of Material, Williamson and Pearse, 1947.

Piotrkow. Town of Poland. It stands on the river Strada and the Warsaw-Vienna rly., 25 m. S.E. of Lodz and 80 m. S.W. of Warsaw. Industries have included tanneries, foundries, and textile factories. In the 15th century the kings of Poland were elected here. Pop. est. 51,000.

Piou-piou. Familiar name for the French soldier of the line. It is more or less equivalent to the British Tommy. See Poilu.

Piozzi, HESTER LYONH (1741-1821). British writer, and, as Mrs. Thrale, friend of Dr. Johnson. She was born at Bodvel, Carnarvonshire, Jan. 16, 1741, and her father, John Salusbury, taking up an appointment at Nova Scotia, she was brought up by his brother Sir Thomas at Offley Hall, Herts. Here she became acquainted with Henry Thrale, son of a rich brewer, whom she married in 1763. They made their home at Streatham Park, near London, where the long friendship with Dr. Johnson began. Mrs. Thrale's energy and business capacity were of immense assistance to her husband when he became financially embarrassed in 1772. Their liabilities were fully discharged by 1781, when Thrale died of apoplexy, his widow selling the brewery to the Barclays.

A friendship formed in 1780 with Gabriel Piozzi, an Italian musician, ripened into passionate attachment, and after much altercation with her children, Mrs. Thrale married him in 1784.

According to Boswell, Johnson did not like the marriage and became much less intimate with her than before. The Piozzis lived first at Streatham Park, and after 1795 in Wales where Piozzi died in 1809. His widow lived until May 2, 1821. Mrs. Piozzi was a woman of great ability and charm, and widely, though not deeply, read. Her Anecdotes of Dr. Johnson, and a collection of letters that passed between them, throw interesting sidelights on the age. See Johnson; Thrale.

Bibliography. Autobiography, Letters, and Literary Remains, 1861; Piozziana, by a Friend, E. Mangin, 1833; Mrs. Thrale, Sketches of Her Life, L. B. Seeley, 1891; Dr. Johnson and Mrs. Thrale, A. M. Broadley, 1910; Piozzi Marginalia; ed. P. Merritt, 1926.

Pipe. Tubular conduit used primarily for the conveyance of gases, liquids, and granular solid matter. The normal circular section combines strength with lightness in structural members in airframes, furniture, scaffolding, and staging. Steam generators, as distinct from boilers, are largely continuous coils of small-bore pipes.

The earliest pipes were of hollowed tree trunks, one end of each sharpened pencil-wise to fit into the bore of the next length. Egyptian relics include stone-cased sheet-copper pipes dating from about 2700 B.C.

Most pipes are made by variants of four main processes: forming, drawing, extruding, and casting. Steel pipes are formed from strip, welded or riveted lengthwise. Flexible metallic pipes, and rubber pipes reinforced with canvas, are made by winding strip helically round an internal mandrel. Seamless pipes of many metals are forged hot from a solid billet pierced to form a short thick-walled pipe which is then elongated over a mandrel. Pipes of lead, aluminium, rubber, and plastics are normally extruded through a cored die from a container of semi-molten material

under hydraulic pressure. Pouring molten or other liquid material into prepared moulds, one of the oldest processes, is useful for ceramics, concrete, iron, and steel. Pottery materials are kiln-baked with or without glazing after casting.

Joining methods vary widely. Welding has largely eliminated screwed, flanged, and other compression unions, except at access points, and for small pipes. Soldering and brazing have wide application on soft metals like lead and copper. Cast pipes often incorporate the spigot and socket joint, which relies for soundness on a caulked packing of lead, cement, or other filling.

Pipe. In music, a general name for wind instruments, more particularly those of the whistle or flute family, and thence by analogy the sound of the song of birds. It is also the medium by which sound is produced in the organ (*q.v.*). Here the pipes vary in (a) length, governing the pitch; (b) scale, or proportion of diameter to length; and (c) material and shape, affecting the quality, though here the question of "voicing" comes in. They may be open, or stopped, and made of wood or metal (tin, "spotted metal," zinc, etc.). A set of pipes having the same quality and ranging through the whole compass is known as "a stop." Stops are composed either of flue pipes or of reeds; if the former, the wind conveyed from the bellows impinges upon the lip of the pipe, thereby setting in vibration the column of air therein; if the latter, the sound is produced by a tongue of metal, the pipe being less important.

Pipe. Utensil for inhaling tobacco smoke; usually a tube of clay or wood, with a bowl to hold the tobacco. Pipes were introduced into England in 1586 by Ralph Lane, governor of Virginia.

Pipe making became an organized craft in London in 1619. Clay was the first material used, and still furnishes the cheapest pipes. Roughly shaped, it is drawn over a steel rod and put in the bottom half of a mould, which, with the top piece, is placed in a press; a lever, with a cone-shaped projection to form the bowl, is pulled down; the top of the bowl is cut clean by a knife drawn through an opening. Placed on a support at each end, the pipe is curved by its own weight; it is then baked, polished, and the end tipped with molten sealing wax to form a



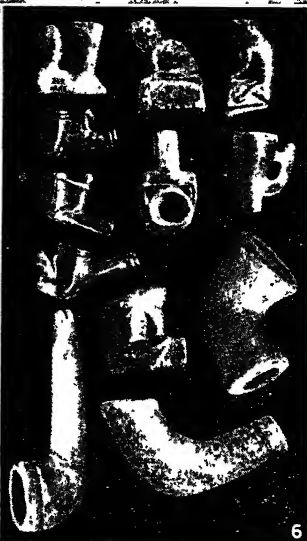
H. Piozzi

mouthpiece. This is the long variety called the churchwarden, but the short clay pipes called cutties in Ireland, or dhudeens, are made by the same method.

Wooden pipes are now in almost universal use, the wood being chiefly that of the tree heath,

Erica arborea, French *bruyère*, whence the popular name of briar pipe. The tree is grown chiefly in S. France, Italy, and Asiatic Turkey, and pipes are

In the 18th century fine porcelain pipes were made at Chelsea, Sèvres, Dresden, Vienna, and elsewhere, and heavy, pendent porcelain pipes, often with metal covers, are still popular among Teutonic smokers. Other materials used in pipe manufacture are meerschaum



Pipes for tobacco smoking. 1. Examples from the Upper Nile. 2. Ainu pipe and holder, Yedo. 3. Bamboo pipe, Torres Strait. 4. Bowls and broken stems of Elizabethan and Carolean clay pipes. 5. Wooden pipe said to have been given to Sir W. Raleigh by Indians; top of bowl indicated by x; mouthpiece extends to left. 6. Stone and clay pipes made by American Indians

1, 2 & 3 by courtesy of British Museum; 6, by courtesy of American Museum Journal

largely manufactured in Nuremberg and E. France. The desired colour is obtained by boiling the blocks, skilfully cut from the roots so as to avoid waste, in a vat.

The oldest pipes known are those found in the so-called pipe mounds of the Mississippi valley. Apart from their archaeological and ethnographic value, they are interesting owing to their want of stems. They were formed of one piece of stone, 3 to 4 ins. long and about 1 in. broad, with the bowl in the centre and the tube leading to it pierced from one end. Notable American pipes are the calumet (*q.v.*), tomahawk pipe, and the whalebone pipes of the Stikine Indians.

(*q.v.*), ivory, glass, horn, metals, cane, and bamboo. Characteristic pipes are the Turkish chibouque, Indian nargileh, and Persian hookah (*q.v.*). Of pipes smoked by half-civilized peoples, mention may be made of the three-bowled pipe of the Kirghiz, bamboo cylinder of New Guinea, the small metal-bowled pipe of the Eskimo, the antelope's horn with upright wooden stem of E. Africa, and the walrus-tooth pipe of the Laplander.

Pipe. Measure of liquid capacity. It varies according to the locality and the liquid measured. The ordinary pipe is two hogsheads, equivalent to 108 imperial gallons, or 126 wine gallons. Two pipes form a tun. A pipe of Madeira contains 92 gallons; of sherry 108; of port wine 115. See Weights and Measures.



Pipe and Tabor. Two instruments formerly much used to accompany morris-dancing, and known popularly as whittle and dub. The pipe was a kind of small recorder (*q.v.*), but with only three holes, two at the front for the first and second fingers, and one at the back for the thumb. The player held it in his left hand, from the wrist of which hung the tabor, a small shallow drum a foot or so across, which was beaten with a stick in his right hand. See Morris Dance.

Pipe Clay. Variety of natural clay. It is used for whitening military accoutrements, etc., and for making certain kinds of pottery.

Pipe-fish. Popular name for a group of long, slender fishes constituting several genera of the family Syngnathidae. The skeleton is incompletely ossified, and the angular, ridged exterior is covered with large, bony plates. There are no ventral or anal fins, and the long dorsal fin is without rays. The jaws are united to form a long tube with the small mouth at its extremity. Gills take the form of paired tufts upon the bronchial arches, and the gill-cover is a large, fixed, bony plate with only a small aperture to admit water to the gills. Usually the males are provided with marsupial pouches in which they carry the eggs until hatched. They live among seaweeds in shallow water.



Pipe-fish. The long, slender fish that lives among seaweeds in shallow waters
W. S. Berridge, F.Z.S.

Five species are found on the British coasts. Of these the straight-nosed pipe-fish (*Nerophis ophidion*) may be 2 ft. in length; the greater pipe-fish (*Syngnathus acus*) and the broad-nosed pipe-fish (*S. typhle*) each 15 ins.; whilst the smooth and cylindrical worm pipe-fish (*Nerophis lumbriciformis*) is only five or six ins. In the last-named the eggs are embedded in the skin of the male.

Pipe Line. Pipe used for conveying fluid over long distances. Fluids commonly transported are natural gas, coal gas, water, crude oil, and refined petroleum products. The pipe is usually of steel, lengths being joined by welding or by special couplings, but concrete and wood are occasionally used. Where practicable, pipes are buried. Corrosion must be prevented and so it is often coated with bituminous paint and wrapped with bitumenized paper or cloth. Corrosion is an electrochemical phenomenon and another preventive measure is to pass an electric current, often generated by windmill, from a conductor, usually some old pipe buried near by, to the pipe line. Choice of a route for the pipe is based on a careful survey to avoid major topographical obstacles. Rivers are crossed sometimes by special bridges, sometimes by laying the pipe in the bed of the stream. When the fall is considerable, e.g. when piping water from a mountainous district to sea-level, it is necessary to break the line at intervals with open reservoirs to avoid too great an internal pressure in the pipe. More frequently the fall between beginning and end of the pipe line is insufficient to maintain the required flow; there may even be a rise instead of a fall. In either case pump stations have to be built along the route. Very viscous oil may be heated to reduce the resistance to flow.

In 1944 pipe lines were laid across the English Channel (see Pluto); and a pipe-line was constructed alongside the Ledo Road (q.v.) running from Calcutta to carry oil to U.S. air forces in Yunnan. Commercial pipe lines have been laid from Montreal to Portland, and in the U.S.S.R., Persia, Iraq, Palestine, Rumania, and in various parts of the U.S.A.

Piper, JOHN (b. 1903). British painter. Born Dec. 13, 1903, he was educated at Epsom college and the R.C.A. He became prominent with water-colour drawings and aquatints of architectural subjects executed in a dramatic style. Dur-

ing the Second Great War he was commissioned to paint the ruins of the house of commons and other famous buildings, and among his finest works was a series of water-colour drawings of Windsor Castle, 1941-42. He also illustrated books and designed décors for the ballet. His publications included *Brighton Aquatints*, 1939, and *British Romantic Painters*, 1942. Piper is represented at the Tate Gallery, and Victoria and Albert Museum.

Piperaceae. Family of herbs and shrubs, widely distributed over the warmer regions of the earth. They have jointed stems and the leaves are mostly alternate or in whorls. The flowers are small, disposed in spikes or sprays. Many of them are aromatic; some produce acrid resin or aromatic volatile oil. There are about 1,150 species, distributed over seven genera. See Betel; Pepper.

Piperine ($C_{17}H_{19}NO_3$). Alkaloid contained in the fruits and seeds of different kinds of pepper, from which it may be obtained by warming with milk of lime, evaporating to dryness, and extracting the residue with ether.

Pipe Roll. Term applied to the Great Roll of the Exchequer preserved in the Record Office, London. It contains the accounts of the revenue collected by the sheriffs, which were called pipes, either because they were sent to the crown office in cylinders, or because of their tubular form when rolled. The records go back to the reign of Henry II, and provide

much information on matters relating to the revenue of the crown, etc. See Record Office.

Pipette. Narrow graduated glass tube adapted to deliver small volumes of liquid and employed in chemical analysis. The liquid is introduced into the pipette by applying suction from the mouth at the upper end, while the lower end is dipped into the liquid. The upper end is then rapidly closed by applying the finger.



John Piper,
British painter

One kind of pipette is adapted for delivering one volume of a liquid, while another variety has graduations throughout its length, and small amounts of liquid can be released by relaxing the pressure of the finger on the upper end.

Pipil. American Indian tribe in S.E. Guatemala and Salvador at the time of the Spanish conquest. An early offshoot of the ancient Mexican people, speaking primitive Nahuatl, they maintained their independence amid the Maya civilization. See Nahua.

Piping Crow (*Gymnorhina*). Genus of birds forming a sub-family of the crows. There are three species, all restricted to Australasia.

They have black and white plumage, and are often called Australian magpies. In captivity they display great skill in learning to whistle tunes and to talk, for which reason they are popular as pets. Their food consists mainly of grasshoppers and other insects.

Pipi Pods. Astringent seed pods of *Caesalpinia pipai*, used as a dye-stuff, but inferior to those of *C. coriaria*. See Divi-divi.

Pipit (*Anthus*). Genus of small passerine birds, related to the wag-tails. Great Britain possesses four

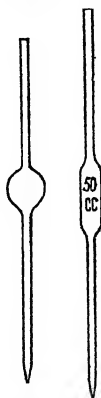


Piping Crow, the
white-backed species



Pipit. - *Anthus spinoletta petrosus*, the
rock pipit of Britain

species. The meadow pipit (*Anthus pratensis*), the commonest, is to be seen almost everywhere in the country, running on the ground in search of insects and seeds. The tree pipit (*A. trivialis*) is migratory, arriving in April and leaving in Sept. In appearance it is difficult to distinguish from the meadow pipit. The rock pipit (*A. spinoletta petrosus*) is the only British song-bird that lives among the rocks on the coast, where it feeds on small crustaceans and worms.



Pipette. Types
used in chemi-
cal analysis

The water pipit (*A. spinoletta*), Richard's pipit, and the tawny pipit are only occasional visitants to the S. of England. The pipits are often mistaken for larks, to which they are very similar, and are locally known as larks, e.g. the tree pipit is called the woodlark in Scotland and the meadow pipit generally is the titlark. See Egg colour plate.

Pippin. Name for many varieties of apple, notably Cox's Orange Pippin, Newtown Pippin, Ribston Pippin. The word was once applied to any apple raised from pips and not by grafting. See Apple.

Piqué (Fr., quilted). Name given to fabrics in which ribs raised in high relief are woven longitudinally.

Piquet. Card game known in England in the 16th century as *la romfe* and subsequently in the time of Charles I as piquet. It is played by two persons with 32 cards, the six down to the deuce inclusive of each suit being discarded from the ordinary pack. The cards rank thus, ace, king, queen, knave, ten, etc.; the ace counts the highest both in cutting and play, and there are no trumps. Each player receives twelve cards, dealt in twos or threes. The remaining cards are laid upon the table face downwards; the three bottom cards being placed in a row, and the other five in another row over them, these forming the stock or *talon*. The object of the game is to score points for certain combinations and for tricks. The game begins by the players examining their hands; if the leader or elder hand (non-dealer) has no king, queen, or knave—termed *carte blanche*—he announces it, and scores 10 points. If the second player has a *carte blanche* hand, he does not declare it until the leader has discarded. The non-dealer has considerable advantage from being elder hand; he can take any five cards from his hand which are least likely to increase his score, and, laying them aside, take as many from the *talon*. The younger hand then lays three and takes the last three of the *talon*.

The following combinations are to be tried for: *Carte blanche*. Having no picture card in the hand; this takes precedence of everything else (= 10 points). *Fours or Quatorze*. Four aces, kings, queens, knaves, or tens (each quatorze = 14 points). *Threes*. In aces, kings, queens, knaves, or tens (= 3 points). *Point*. The greatest number of pips on cards of the same suit (= as many points as

cards). *Tierce*, or three of a sequence (= 3 points). *Quart*, or four of a sequence (= 4 points). *Quint* or five of a sequence (= 5 points). *Sixième*, or six of a sequence (= 6 points). *Septième*, or seven of a sequence (= 7 points). *Huit*, or eight of a sequence (= 8 points).

The elder hand calls what he holds, and his opponent, if he cannot beat it, replies, "Good," and the elder hand proceeds to count it; otherwise his opponent says "Equal" or "Not good." The first procedure is to call and score the *point*, the player holding the highest in this regard only scoring it. The other combinations are then counted aloud by each, after which they proceed to play for the tricks.

There being no trumps the highest card of each suit wins the trick. A player is bound to follow suit if he can, but is not obliged to take the trick. The leader counts one for each card led, whether it wins a trick or not. If the trick falls to the second player he also counts one; then leads the next card, counting one for the card led, and so on. The winner of the last trick counts one extra for the last card. Tricks are placed face upwards, as played. The player who takes the most tricks scores 10; if he wins them all (*capot*) he scores 40. *Pique* is when the elder hand counts 30 in hand or play before his opponent has scored, in which event he adds 30 more to his score. *Repique* is when either player can score 30 from the combinations in his hand before a card is played, in which event he scores an additional 60. A game consists normally of six hands. *Pron. pikett*.

Piracy (Gr. *peirātēs*, an adventurer who makes attacks on ships). The offence by common law of destroying or attacking a ship or taking any part of its cargo on the high seas or of attempting to do so by persons who are not authorised by any state or lawful authority. The British courts may try persons whether British subjects or not for piracy on whatever part of the seas the offence took place. Various Acts of parliament make certain other offences statutory piracy, e.g. a master of a ship who trades with pirates. Piracy if it involves endangering the life of any person on a ship becomes a capital offence. In other cases the maximum punishment for common law piracy is life imprisonment and for statutory piracy three years' imprisonment.

Piracy, as we see from the poems of Homer, was regarded as an honourable calling among the Greeks. The Romans had to deal with pirates in the Mediterranean, where they were again notorious until early in the 19th century. See *Buccaneers*; Kidd, W.; *consult The Pirates' Who's Who*, Philip Gosse, 1924.

The word pirate has been applied by analogy to other forms of illegality; thus pirate music is sheet music printed and sold with slight alteration to avoid the law of copyright; books are pirated in a similar way; a pirate listener in the U.K. is one who avoids paying a licence; and pirate bus was a term applied in London to any privately owned bus using routes and goodwill of the London General Omnibus Co.

Piræus. One of the chief seaports of ancient Greece. Situated on the Saronic Gulf, 6 m. S.W. of Athens, it owed its foundation to Themistocles and Pericles. It was destroyed by Sulla, 86 B.C., and was not rebuilt until the 19th century, after the establishment of the modern kingdom of Greece. Formerly connected with Athens by the well-known "Long Walls," it now has railway communication. It has become the second largest city of Greece with pop. 284,070. *Pron. Py-ree-us*.

During the Second Great War Piræus was occupied by the Germans in April, 1941, and evacuated by them in Oct., 1944. A British Commando unit landed here Oct. 13. Fighting broke out between British troops and Greek *Elas* (left-wing) units on Dec. 7, the latter endeavouring to advance upon Athens. Fighting continued until the signing of a truce, Jan. 15, 1945. See Athens.

Pirandello, Luigi (1867-1936). Italian dramatist. Born at Girgenti, Sicily, June 28, 1867, he



Luigi Pirandello,
Italian dramatist

studied in Rome and at Bonn university, and became a teacher. He published three volumes of verse between 1889 and 1895, then turned his attention to the novel. *Il fu*

Mattia Pascal, 1904, foreshadows the theme (the problem of personality) of his plays, the first of which, *La Morsa*, a one-act drama, was produced in 1912. Thenceforth the stage was his chief

preoccupation. *Se non così*, 1917; *Così e se vi pare*, 1918; *Tutto per bene*; *L'Imbecille*; *Enrico IV*; *Come tu mi vuoi*; and *Ciescuno a suo modo*, were translated into many languages and produced all over the world. In England and the U.S.A., the best known were *Six Characters in Search of an Author*; *And That's the Truth*; *The Mock Emperor*; and *As You Desire Me*. He opened his own theatre in Rome in 1925, and formed a company which toured Europe in his plays. Awarded the Nobel prize for literature, 1934, he died Dec. 10, 1936.

Pirandello's importance in modern drama derives from his ability to create characters of universal significance. His main theme is the power and prevalence of illusion; it is for him the dominant factor in life and its gradual dispelling is tragedy. He maintains that man constructs an identity for himself, sometimes deliberately as in *Enrico IV*, sometimes unconsciously as in *As You Desire Me*, and that he is compelled to realize that he stands alone. At the same time he appears differently to every other person, and no one man's impression of him is more real than another's. *Consult* Lives, W. Starkie, 1926; F. Paiai, 1927.

Piranesi, GIAMBATTISTA (1720-78). Italian engraver and architect. Born at Venice, the son of a mason, he studied under Valeriani and G. Vasi, the engraver. He started practising as an architect in Venice, but was attracted to Rome, where he at once began the engravings of ancient monuments published in 1750 under the title of *Della Magnificenza ed Architettura dei Romani*. He etched nearly 2,000 plates before he died in Rome. A picturesque draughtsman, addicted to moonlight effects with strong light and shade, he drew also with the enthusiasm and knowledge of an antiquary, and his work is of inestimable value to the student of architecture. *Consult* Piranesi: *His Life and Works*, A. Samuel, 1910.

Pirano. Town and port of Italy, in the peninsula of Istria. It is 13 m. S.W. of Trieste. Salt is the chief export from the convenient harbour. Parts of the ancient fortifications still stand; the cathedral rises from massive foundations on the N. shore. Tartini, the composer, was born here in 1692.

Pirate, THE. Sir Walter Scott's fourteenth novel, published in Dec., 1821. It is a romance of Zetland (Shetland) and

the Orkneys at the close of the 17th century, and is remarkable for its scenic descriptions and its reflection of the author's philosophy of life. Cleveland, the pirate, was drawn from John Gow, who was captured in 1725. A notable character is Norma of the Fitful Head.

Pirates of Penzance, THE, OR THE SLAVE OF DUTY. Comic opera written by W. S. Gilbert, composed by Arthur Sullivan. It was produced April 3, 1880, at the Opéra Comique Theatre, London, and had a run of 363 continuous performances. The characters consist of pirates, policemen, and a major-general and his daughters; and the many tuneful and witty numbers include *Poor Wandering One*, *The Modern Major-General*, *The Policeman's Chorus* ("When the foeman bares his steel, ta-ran-ta-ra"), and the song of the Police Sergeant ("A policeman's lot is not a happy one").

Piraya OR CARIBE. Fish (*Serrasalmus ternetzi*) occurring in rivers of S. America. It has a deep, blunt head with powerful jaws and sharp teeth, and is renowned for its ferocity. Swarms of piraya, which normally prey on other fish, have been known to attack human beings. If a man is killed the flesh is neatly picked off the bones without damaging the clothes. The greatest length attained by the piraya is less than 2 ft.

Pirbright. Village of Surrey, England. It lies 6 m. N.W. of Guildford. The church, built in 1785, has a typical "Hertfordshire extinguisher" steeple, and in the churchyard is the granite tomb of Stanley, the explorer. Adjacent to the village is an army camp, and 1 m. N. is the Bisley (q.v.) rifle range. Pop. approx. 4,000.

Pirène. Fountain at Corinth, Greece. It issued from the rock on the Acrocorinthus. It was said to have first gushed forth at the stamp of the foot of the winged horse Pegasus, which Bellerophon (q.v.) caught here.

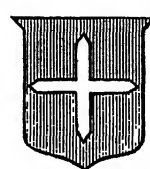
Pirmasens. Town of Rhineland-Palatinate, W. Germany, 40 m. W.S.W. of Spire. The chief industry is the manufacture of boots and shoes and the preparation of leather. In the 18th century Pirmasens was part of Hesse-Darmstadt, and in 1815 passed to Bavaria. It is named after S. Pirmin, who preached here in the 8th century. After the Second Great War it lay in the French zone of occupation. Pop. (1950) 38,700.

Pirna. Town of Saxony, E. Germany. It stands on the Elbe, about 10 m. S.E. of Dresden, and was in

medieval times a fortified town. The chief industries are making glass and pottery. There is a trade in grain along the Elbe, and stone is quarried in the neighbourhood. Above the town is the Sonnenstein, once a strong fortress commanding the Elbe, and earlier a castle that protected the town, later used as a lunatic asylum. The fortifications, both of the city and on the hill, were destroyed in the 18th century. In early days part of Meissen, Pirna was included in the duchy of Saxony about 1423. After the Second Great War it came within the Russian zone of occupation. Pop. (1950) 38,500.

Piron, ALEXIS (1689-1773). French dramatist. Born at Dijon, July 9, 1689, he settled in Paris in 1719, and first won success with a dramatic monologue, *Arlequin Deucalion*. Of his numerous plays only one survives, *La Métromanie*, 1738, which ranks among the best comedies of the 18th cent. Piron was famous for his wit and caustic epigrams. He died Jan. 21, 1773.

Pisa (Lat. *Pisae*). City of N.W. Italy, capital of the maritime prov. of Pisa. It stands on the Arno,



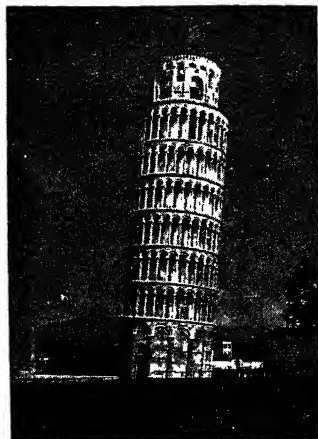
Pisa arms

7 m. from the Ligurian Sea and 50 m. by rly. W. of Florence. Famous in art and history, its present business is mainly with tourists and the university. The busiest part of the town is built around the banks of the Arno, but the most interesting quarter is the Piazza del Duomo.

The fine cathedral, built 1063-1118, and restored in the early 17th century, is of white marble with an elliptical dome and an arcaded façade. Its roof was slightly damaged by shell fire in 1943. The circular marble baptistery (1153-1278) has an octagonal font and a fine hexagonal pulpit by Niccolò Pisano. The campanile, usually known as the Leaning Tower, was built 1174-1350 and rises to a height of 179 ft. in eight colonnaded storeys. It is 16½ ft. out of the perpendicular, the ground on the S. side having presumably sunk. In 1928 a British firm secured a contract for strengthening the tower. The beautiful cloistered cemetery (Campo Santo) (1275-84), with earth reputed to have been brought from Calvary, built in Tuscan-Gothic style and with medieval frescoes and Etruscan and other sculptures, was partly burnt out in 1944, when precious

frescoes by Gozzoli were destroyed, though parts of them were later laboriously restored.

Among other interesting churches are S. Maria della Spina (1325-29),



Pisa. The famous Leaning Tower built 1174-1350

the basilica of S. Michele in Borgo, (with Gothic façade intact although the north nave was demolished during the Second Great War); S. Paolo and S. Niccolò, both of the 13th century. The university, a 12th century foundation, is housed in a handsome Renaissance building and has a library with over 200,000 volumes and many valuable MSS. The municipal museum has a representative collection of Tuscan paintings and sculptures; there are also a natural history museum, botanical gardens, and an art academy. The leading industry is the manufacture of cottons. In the vicinity are thermal mineral springs and a national stud farm for horses and dromedaries. It was off the village of Gombo, 1½ m. W., that Shelley was drowned July 8, 1822.

Originally a Greek colony, Pisa became later an important Etruscan city and then a flourishing Roman port, whence marble and wood were shipped. After its decline under the domination of the Franks, Pisa rose to importance again by the 11th century, and, after a series of successful conflicts with the Saracen pirates, became a flourishing naval republic, with dominion over Corsica, Sardinia, and the Balearic Isles. In 1099 it sent vessels to the 1st crusade. After continuous struggles with Florence, Pisa was vanquished in 1405, and remained an integral part of Tuscany until the unification of Italy in 1860. On Sept. 2, 1944, it was occupied by the Allied

5th army, the Germans retreating N. Pop. 82,623. See Architecture illus. p. 570; Baptistery; Campo Santo, and illus.; Pulpit, and illus. Consult The Story of Pisa, J. A. Ross and N. Erichsen, 1909.

Pisa, COUNCIL OF. Church council held in 1409 to settle the great schism occasioned by the residence of the popes at Avignon. Summoned by the college of cardinals, the rival popes Gregory XII and Benedict XIII refused to appear, and the council of 24 cardinals, 80 bishops, and many other ecclesiastics of authority declared them both schismatics and elected Peter Philarges (Alexander V) to the papal throne, June 26. The schismatics refused to recognize the authority of the council, and the schism lasted another 30 years.

Pisagua. Seaport of Chile, in the prov. of Tarapacá. It is 46 m. N. of Iquique, with which it is connected by rly. Its chief export is nitrate of soda. In 1868 and 1877 it was almost destroyed by earthquakes. Near the town the Chileans defeated an army of Peruvians and Bolivians. Nov. 19, 1879.

Pisano, ANDREA (c. 1270-1349). Italian architect and sculptor. Born at Pontedera, he constructed a good part of the fortifications of Florence, and the stronghold of Scarperia in the Val di Mugello. His greatest achievement, however, was the decoration in relief of one set of gilded doors for the baptistery at Florence, two other sets being executed by Ghiberti. He worked also at Venice, and died at Orvieto, where he was cathedral architect.

Pisano, NICCOLÒ (c. 1206-78). Italian sculptor, born either at Pisa or in Apulia. His best known works are the sculptured pulpit of the baptistery of Pisa, 1260, and that of Siena cathedral, 1268. These are inspired by the classic remains of Tuscany. He worked also at Bologna and Perugia. Architect and engineer as well, he influenced his many pupils in the direction of a less hieratic art than had previously obtained in Italy.

Pisano, VITTORE, OR PISANELLO (c. 1380-1456). Italian painter and medallist. Born at San Vigilio, he painted frescoes at Verona, Ferrara, Venice, Mantua, excelling in the renderings of animals, particularly horses; an example is the fresco of S. George, painted for S. Anastasia, Verona. Animal life is also well interpreted in his panel, Miraculous Stag appearing to S. Eustace, in the National Gallery, London. A great number of portrait medals of contemporary nota-

bilities were executed by him. He died in Rome.

Piscary, COMMON OF, OR COMMON OF FISHERY. English law term, describing the right of fishing in another man's water. The right is annexed to land. In some ancient manors the whole of the freehold tenants of the manor, and in others the tenants of certain farms, have a right to fish in the rivers or ponds of the lord of the manor. This is the original common of piscary. Sometimes the right extends only to certain seasons of the year, sometimes only to certain kinds of fish. A several fishery is an exclusive right to fish in certain waters. See Angling.

Pisces (Lat., fishes). Zoological name for the class of vertebrates popularly known as fishes. See Animal; Fish.

Pisces. In astronomy, the twelfth constellation of the Zodiac. It contains no bright stars. Alpha Piscium is a variable double star of the fourth magnitude, while Zeta and Eta Piscium are triple. Owing to precession of the equinoxes the first sign of the Zodiac, Aries, is now in this constellation. See Constellation; Zodiac.

Piscina (Lat., a fishpond, cistern). In eccles.

architecture, a bowl for water recessed in a niche, in which the priest could wash his hands or the sacred vessels after the service. Its place was generally in the sanctuary wall, south of the altar; where there was more than one altar, a piscina might be found in the neighbourhood of each. The

piscina and its architectural setting were often very elaborately decorated. In Roman architecture the term signified either a fishpond or a tank for bathing.

Piscis Australis OR THE SOUTHERN FISH. One of the southern constellations. The chief star of the constellation is Fomalhaut or the Fish's Mouth, one of the four ancient royal stars.

Pisé de Terre (Fr., rammed earth). Walling material of wet earth, clay, or chalk mixed with chopped straw and rammed into position in layers. The surface is treated with yellow limewash to



Piscina in the chapel of S. Mary Magdalene, Exeter Cathedral

resist weather and give decorative finish. It is used traditionally for cottage walls, chiefly in Devon, where it is usually called cob, and France, where many old examples still stand. The walls are low and thick, and thatched roofs overhang at eaves to give extra protection against rain. Early in the 20th century it was revived in the S. and W. of England, when a wooden framework was used to hold the cob until it set hard. It was also used in America and Australia.

Pisek. Town of Czecho-Slovakia, in Bohemia. It is 24 m. W.S.W. of Tabor, and is a rly. junction on the Watawa. A medieval castle and fortifications are still preserved. Here is a state school of forestry and agriculture. Woollens and cottons, iron wire, and musical instruments are manufactured. Pop. est. 17,000.

Pisgah. Mt. summit in Moab. From it Moses was permitted sight of the land of Gilead (Deut. 34). The word is usually accepted as an alternative for Mt. Nebo, or as indicating a summit of that mt.

Pishin. Part of the district of Quetta-Pishin, Baluchistan, Pakistan. Occupied by the British from 1878 until the transfer of power to Pakistan in 1947, it lies N. of Quetta. The rly. from Quetta to Kandahar passes through it. Area of Quetta-Pishin district 5,310 sq. m. Pop. 156,289.

Pisidia. Inland dist. of Asia Minor, lying N. of Lycia and Pamphylia. In ancient times the inhabitants, a hardy and warlike folk, succeeded in maintaining some degree of independence even against the Romans.

Piso, LUCIUS CALPURNIUS. Roman statesman. As consul at Rome, 58 B.C., he took a leading part in the proceedings which led to the banishment of Cicero. He was governor of Macedonia, 57-56, and was attacked for extortion by Cicero in two speeches. He was father-in-law of Julius Caesar.

Gnaeus Calpurnius Piso, governor of Syria under Tiberius in A.D. 18, was accused of the murder of Germanicus, and committed suicide before the trial. Gaius Calpurnius Piso conspired against Nero in A.D. 65, and committed suicide on the discovery of the conspiracy. See Germanicus.

Pisolite. In mineralogy, a rounded concretionary structure, often seen in pisolitic limestones, which are formed of granules produced by the deposition of calcium carbonate in successive layers around small nuclei. Pisolite differs from oolite by its larger granules

Pissarro, CAMILLE JACOB (1831-1903). French painter. Born at St. Thomas, in the Danish Antilles, of

Spanish - Jewish descent, he studied in Paris under Antoine Melbye and Corot. His earlier sympathies were classic, but he came under Manet's influence and was one of the first Impressionists of 1874. Later, he launched and led the school of Pointillism (*q.v.*), but did not adhere too strictly to the theory of the division of tones held by this group. He virtually confined himself to landscapes, producing beautiful views of Paris, where he died Oct. 12, 1903. J. Rewald published a study 1946.

His son, Lucien Pissarro (1863-1944), became an exponent of the Pointillist method of Impressionism, though he compromised later between Impressionism and Realism. He exhibited many landscapes both in Paris and in London. As an engraver on wood he reproduced several of his father's drawings. Naturalised as a British subject in 1916, he died July 11, 1944.

Lucien Pissarro's daughter, Orovida Camille Pissarro (b. 1893), was well known as an etcher, several of her works being purchased by the British Museum.

Pistachio Nut (*Pistacia vera*). Small tree of the family Anacardiaceae, indigenous to W. Asia. The leaves are divided into three of five oval leaflets, and the small brownish-green flowers are without



Camille Pissarro,
French painter
F. Hollver

forms of confectionery. The tree also produces galls used in dyeing and tanning.

Pistil (Lat. *pistillum*, a pestle). Term for the gynaeceum (female organs) in a flower, including the ovary, the style, and the stigma. The ovary, containing the ovules or seed-eggs, develops after fertilisation into the seed-vessel. The style may be absent, and the stigma seated directly upon the ovary. The stigma may be thread-like (filiform), knobbed (capitate), lobed, etc.; and is either sticky, rough with raised points, or hairy, to retain the grains of pollen. The latter send out pollen tubes which penetrate the length of the style and enter the ovary, where they fertilise the ovules. See Flower.

Pistoia (anc. *Pistoria*). Walled city of Italy, in the prov. of Pistoia. It stands on the left bank



Pistoia, Italy. The cathedral campanile from the Piazza del Duomo

of the Ombrone, 21 m. by rly. N.W. of Florence. The walls date from 1302 and the cathedral from the 12th and 13th centuries. The Palazzo Pretorio, 1367, and the Palazzo del Comune, with the Ospedale del Ceppo, 1277, are fine examples of medieval architecture. Pistoia, in art history, held rank midway between Florence and Pisa; its early sculpture is especially remarkable.

The industries are connected with iron, steel, glass, paper, silk, macaroni, and oil. Pistoia is known also for small arms manufactures. Catiline was defeated here in 62 B.C. The scene of fierce faction fights in the Middle Ages between the Guelphs and Ghibellines, it fell to Florence in 1351.

During the Second Great War direct bomb hits from the air demolished the cloister and S. nave



Pistachio Nut. Leaves and nuts of the plant. Inset, single nut

petals, the sexes on separate trees. The oval, reddish fruits are about an inch long, and contain a single green, oily seed enclosed in a bony shell. They are eaten dry like almonds, or made into various



Pistol. Early and modern forms of the weapon. 1. Double horse pistol, 16th century. 2. Double pistol, 17th century. 3. Italian dag or short heavy piece. 4. Double pistol with single trigger actuating two hammers. 5. Double-grip saddle pistol with cartridge ejector. 6. Colt's Derringer, single-barrelled pistol. 7. Colt hammerless automatic pistol with 6-shot magazine. 8. Mauser automatic, showing method of inserting clip of 10 rounds

of S. Domenico, and the cupola and many 16th century paintings in S. Giovanni al Corso were destroyed. The city was taken from the Germans, Sept. 10, 1944, by the S.A. 6th armoured div. fighting with the 5th army. Pop. 74,309. *Pron.* Pistô-ya.

Pistol (Fr. *pistolet*, originally a dagger, made at Pistoia). Firearm which can be used from one hand. On this definition it would appear to have been invented about 1500. In 1515 the wheel-lock was evolved, making a great advance in the mechanism of firearms generally, and gave a decided impetus to pistol manufacture, since it was then possible to construct a weapon which could easily be carried or concealed on the person. These pistols were frequently constructed with bell mouths for use at close quarters with a scattering charge. The flint-lock became well known about 1630, but it was some time before it entirely superseded the wheel-lock, retaining its position until about 1825.

Before the end of the 17th century pistols about 18 ins. long were being made, and shortly afterwards, owing to better methods of manufacture and increased accuracy, the size was further reduced. Pistols with a half-inch bore became duelling weapons in 1780. Rifled pistols were often constructed so that the barrel would screw out of the breech block to facilitate loading, and two- and four-barrelled pistols

were introduced, one hammer firing the barrels successively as the various priming pans were brought under it by a hand-operated mechanism. The percussion cap came into use about 1815, and by 1830 had displaced all other types of ignition. By this time the weapons were practically all rifled. By 1835 the revolver was highly developed, and practically no further advance has been made. Now a few breech-loading single-barrel pistols are made, but these chiefly fire the .22 rim-fire cartridge, and are used only for target practice. At one time the .410 single Derringer pistol was much used as a pocket pistol in W. America and is still sold in the U.K.

The next development of this weapon is more recent and concerns the automatic pistol, which in some fields seems likely to displace the revolver. This is an adoption of the machine-gun principle in which the recoil of the weapon actuates mechanism which ejects the empty shell, cocks the pistol, and reloads the chamber from the magazine ready for the next shot. The first weapon of this type was made by Borchardt in 1893; it was large and cumbersome. Next year one was constructed by Bergmann, and this is actually the ancestor of the small flat pocket pistol of today. In 1898 the Mauser was produced, a large weapon provided with a wooden holster which could be

fitted to the butt, converting the pistol into a small carbine. It has an effective range up to 600 yards, and was much used by the Boers in the S. African War. It is still used in the 9-mm. calibre. The Mauser was followed by the Mannlicher, a similar weapon, but arranged to accommodate the magazine in the butt instead of in front of the trigger guard, an innovation which has been retained in this type of weapon ever since. Other automatic pistols are the Browning, Colt, Luger, P38, and Webley. The Luger pistol used by German parachute troops in the Second Great War had a rigid holster which could be screwed to its butt to form a stock like that of a rifle.

All pistols depend on the same principle, the recoil moving the barrel and breech block to the rear, whereby the reloading operation is effected. Cartridges are carried in a magazine in the butt, being forced upwards by a spring so that one is always in the correct position to be fed into the chamber. The weapon can be quickly reloaded. An automatic pistol is lighter and more accurate than a revolver. Being flat, it is much more readily carried in the pocket, and can be fired three times as rapidly. The stopping power is not so good, as the small high-velocity bullets may pass right through an assailant without putting him out of action, and there is a greater tendency for

the weapon to jam if dirty. *See* Ammunition; Duel; Firearm; Revolver.

Pistol. Comic character in King Henry IV, Part 2, The Merry Wives of Windsor, and King Henry V. He specialises in high-flown language and nonsensical boasting, e.g., "What, shall we have incision? Shall we imbrue?" In the first of these plays he is an ancient, one of the tavern companions of Falstaff, who turns him out of the Boar's Head for insolence to Doll Tear-Sheet. In the second he is discharged from Falstaff's service for refusing to deliver a love-letter to Mistress Page, and takes his revenge by mixing as a hobgoblin with the supposed fairies, and pinching Falstaff in Windsor Park. In the third he is married to Mistress Quickly (who dies before the end of the play), and going to the war in France acts as leader to Nym and Bardolph and quarrels with Fluellen.

Pistole. French name of an obsolete Spanish gold coin in use from the 16th century. A double



Pistole. Obverse and reverse of Spanish gold coin. Actual diameter, $1\frac{1}{2}$ in.

escudo, it was worth about 17s. The word was generally applied to similar gold coins, e.g. the louis d'or.

Piston. In its simplest form, a cylindrical plug sliding in a cylinder and transmitting a constant or variable load due to steam, gas, or fluid pressure. In a pump the load may be transmitted direct to the pump plunger by the piston rod. Generally, however, the reciprocating motion is converted to rotary motion of a crank through a piston rod (Fig. 1) or trunk piston (Fig. 2) and connecting rod.

The piston must fit so as to run easily in the cylinder, and leakage is prevented or reduced by elastic rings, fitting in external grooves, which press outward against the cylinder, the number of rings depending upon the maximum

pressure. Steam engines and some large marine internal combustion engines are double-acting; the piston need be long enough only to avoid leakage and sometimes to control port action. The thrust of the connecting rod is taken by an external guide. In a single-acting engine the overall length can be shortened by the use of a trunk piston, which must have sufficient surface to take the thrust of the connecting rod without undue wear. Adequate lubrication is essential. For slow engines the pistons are usually of a special brand of cast iron, but for high-speed engines, where considerable inertia is involved, aluminium or magnesium alloys are used.

Piston. In music, a valve applied to wind instruments for the purpose of obtaining a complete chromatic scale. The series of sounds producible by any tube has, in accordance with acoustical laws, many gaps in it, especially in the lower part of the compass, and inventors from quite early times have endeavoured to overcome this drawback. The solution was found in valves, which, by increasing the length of the tube, supplied other series as desired. The first valve lowers the pitch a tone, the second a semitone, the third three semitones, and the fourth five semitones. When two or more valves are depressed simultaneously the further changes of pitch can be effected. Thus any note can be obtained, and modulating passages are rendered practicable. The instruments to which pistons are applied are horns, trumpets, cornets, and the different varieties of saxhorns. They have been tried for trombones also, but the same end is better attained by slides. Pistons used in the organ are small buttons placed below the manuals, which on being pressed actuate valves so as to effect certain combinations of stops. *See* Organ.

Pita (Span., aloe). Fibre from the American aloe, *Agave americana*, and other species of agave, which grow in all parts of tropical America. The fibre, variously named pita-fibre, pita-flax, pita-hemp, is tough, and is used for making twine, matting, netting, and paper. *A. rigida*, var. *sisalana* (see Sisal), gives the best fibre for ships' cables. Pita as a name is wrongly applied to *A. iztli*, of

Mexico. The name pita is also sometimes given to the cariacus, a South American deer.

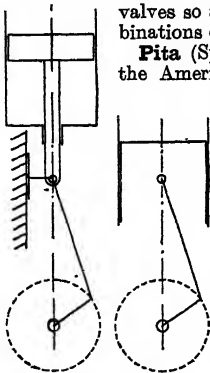
Pitcairn. Island in the Pacific Ocean, area 2 sq. m. It is more than 3,000 m. from any mainland, roughly midway between Auckland, N.Z., and Lima, Peru. Of volcanic origin, it consists of a solitary mountain surrounded by coral reefs, and produces coconuts, bananas, oranges, yams, coffee, maize, sugarcane, and other plants. Discovered in 1767, it takes its name from a midshipman who first sighted it. It is peopled by descendants of the mutineers of H.M.S. Bounty (*q.v.*). Great Britain formally took possession of the island in 1839, and it now has local government under the high commissioner for the W. Pacific. In religion the islanders are Seventh Day Adventists. Pop. 126. *Consult* The Heritage of the Bounty, H. L. Shapiro, 1936.

Pitcairne, ARCHIBALD (1652-1713). Scottish physician and poet. Born in Edinburgh, Dec. 25, 1652, and educated at Edinburgh university and in Paris, he became the foremost physician in Scotland. In an age of Puritanism he attracted attention by his scoffing attitude towards religion, which found expression in the satirical poem on Presbyterianism attributed to him, Babel, and a comedy, The Assembly, or Scotch Reformation. He died Oct. 20, 1713.

Pitch. In music, the precise degree of gravity or acuteness of any musical sound, and depending upon the frequency of vibrations. The greater the number of vibrations per second, the higher the pitch. As commonly employed, the term denotes some standard for a given note, but there is no uniformity in this matter, and the nominal pitch has varied very much in different periods. In 1859 the French government fixed the standard for France at A=435 double vibrations per second, and in 1896 a similar standard was unofficially adopted in Great Britain of A=439 at 68° Fahr. This, the new Philharmonic pitch, is now generally used, though military bands adopted it only in 1927.

Pitch. This naturally occurring mixture of hydrocarbons is described under its alternative name of asphalt.

Pitch. Engineering term. For screws the pitch is the axial distance between consecutive threads. In multiple-threaded screws, the true pitch (known as lead) is the axial distance between a point on one thread and the corresponding point on the same thread after one



Piston. Fig. 1, left, and Fig. 2. *See* text

revolution; alternatively, the distance travelled by the nut for one revolution of the screw. For gear wheels, the pitch is the distance between the centres of two consecutive teeth, measured round the circumference. The circumferential pitch is the circumference of the pitch circle divided by the number of teeth. In practice it is found convenient to use the number of teeth per inch. This is often known as diametral pitch, a term which does not conform to the above definition of pitch. The mean pitch of a screw propeller is the distance the ship would travel in one revolution, assuming there is no slip. The term pitch is also applied to the distance between the centres of consecutive holes in a line of rivets.

Pitchblende, OR URANINITE. One of the most important ore-minerals of uranium and radium. The composition of pitchblende is variable, but it may be considered as a uranium dioxide; UO_2 , the natural mineral, is always more or less oxidised containing variable proportions of UO_3 ; together with thorium, zirconium, lead, etc. Radium results from the disintegration of uranium, and uranium minerals contain minute traces of radium (320 milligrammes of radium per ton of uranium). Pitchblende is velvet-black to brownish, resembling pitch in appearance, and is strongly radioactive. It occurs as a primary constituent of igneous rocks, granites, pegmatite dykes and veins; also as a secondary mineral with ores of silver, lead, copper, tin, etc. Deposits occur in the Belgian Congo, Canada, Czechoslovakia, and elsewhere. See Uranium.

Pitcher Plant (*Nepenthes*). Genus and family (*Nepenthaceae*) of shrubs. Growing native in the E. tropics, they have alternate leaves, whose midrib is prolonged beyond the point and enlarged into

a flask- or pitcher-shaped organ with a partly opened lid. The mouth of the pitcher is strengthened by a thick, corrugated rim, which secretes a sweet fluid, the obvious purpose of which is to attract insects. From the mouth to a variable distance downwards the inner wall is polished, and affords no foothold for insects that have been attracted within. They fall into the liquid which partly fills the pitcher. This liquid has digestive properties capable of reducing boiled white of egg, raw meat, or cartilage. It digests the hosts of insects that visit the pitcher. The flowers are small and greenish. See Californian Pitcher-Plant.

Pitchforth, ROLAND VIVIAN (b. 1895). British painter. Born April 23, 1895, he was educated at Wakefield grammar school, and studied art at Leeds and the Royal College of Art. A member of the London Group (*q.v.*), he was visiting instructor at various London schools of art, and was an official war artist during the Second Great War. In his paintings strong draughtsmanship was combined with a satisfying sense of design and an alertness for the decorative quality of much in the modern landscape that others might deem commonplace or even ugly. One of his best-known works, *Night Transport*, was bought by the Tate Gallery, and he is represented in many provincial galleries. He was elected A.R.A. in 1942. For some years after the war he worked in South Africa.



R. V. Pitchforth,
British painter

Pitch Lakes. Depressions in the ground filled with seepage asphalt. They are generally shallow, but may be of considerable area, e.g. the Bermudez pitch lake in N.E. Venezuela which averages four to five ft. in depth and has an area of 1,000 acres. There are similar lakes in Iraq, Mexico, California, Russia, W. Africa, and elsewhere, although all are not specifically called lakes. The most famous pitch lake is that in Trinidad, which was first described by Sir Walter Raleigh in 1596, and is unique. It is 110 acres in area and 285 ft. deep in the centre. The lake asphalt is an emulsion of 39 p.c. asphalt, 27 p.c. silt and clay, and 34 p.c. water, and was most probably formed by seepage of asphaltic oil into very soft mud, emulsification

being aided by churning due to gas escape. The asphalt is dug by hand and taken to a refinery where it is heated to drive off water and then run through a screen into barrels, the refined material being called refined Trinidad lake asphalt or Trinidad epuré. It is used as an asphaltic cement in paving, roofing, and flooring.

Pitchstone. In geology, name given to a glassy igneous rock, remarkable for the amount of contained water in its composition. It is lustrous, and dark grey-green, brown, or nearly black in colour. The best specimens are found in Arran in Scotland, and near Meissen in Saxony. See Obsidian.

Piteå. River of N. Sweden. It rises in two lakes S. of Mt. Sulitelma, and, flowing S.E., enters the Gulf of Bothnia in a bay containing the Isle of Pitholm. Its length is about 200 m. The small town of Piteå is on the coast some 30 m. S.W. of Luleå.

Pithecanthropus Erectus. The erect apeman. The systematic name was given by Eugène Dubois in 1894 to some fossil bones, including the roof of a skull, three teeth, and a thigh bone, which he discovered near Trinil, Java. The earliest anthropoid with human characters yet known, it is held to represent a collateral rather than an ancestral or missing-link stage in human development. The age of the deposits is early Pleistocene or late Pliocene. See Anthropology; Ethnology; Man.

Pithom. Store city built by the Hebrews, according to Biblical tradition, for the Pharaoh of the Oppression (Ex. 1). It was the Egyptian Pa-Tum, and Naville's excavations in 1883 localised it at Tell el-Maskhuta, 11 m. W. of Ismailia. Rectangular brick structures having access only through the roof were regarded by Naville as storehouses, but by later excavators as fort-platforms. The earliest inscriptions are of Rameses II, but evidence is accumulating that the Pharaoh of the Oppression was Thothmes III. See Egypt.

Pitlochry. Tourist resort of Perthshire, Scotland. It is on the left bank of the Tummel, 28 m. by rly. N.W. of Perth. Its bracing climate and picturesque mountainous surroundings have made it a well-known summer resort, and there is a large hydropathic establishment. Tweed manufacture and distilling are carried on. Overlooked by Ben-y-Vraackie, it is at the S. end of the Pass of Killiecrankie (*q.v.*), and near by are the Falls of Tummel. Pop. 2,241.



Pitcher Plant. Example showing the hanging pitchers in which insects are entrapped

Pitman, Sir Isaac (1813-97). British inventor of the phonographic system of shorthand. Born at Trowbridge,



Isaac Pitman

Jan. 4, 1813, he became a schoolmaster in 1832 at Barton-on-Humber, whence in 1836 he went to Wotton-under-Edge. There he established a private school, taught Taylor's shorthand, and published his first treatise, *Stenographic Sound Hand*, 1837. In 1839 he opened a private school at Bath, where he erected a printing press, started, in 1842, the *Phonetic Journal*, later known as *Pitman's Journal*, later still as *Pitman's Journal of Commercial Education*; and laid the foundation of the publishing business of Sir Isaac Pitman and Sons. He was an ardent advocate of spelling reform. Knighted in 1894, he died Jan. 22, 1897. *See* Shorthand; *consult* Lives, T. A. Reed, 1890; A. Baker, 1908.

Pitman, Isaac James (b. 1901). British publisher. Grandson of the above, he was born in London, Aug. 14, 1901, and educated at Eton and Christ Church, Oxford, where he excelled as an all-round athlete. He joined the family publishing firm in 1923, and became chairman and managing director in 1934. He was a director of the Bank of England, 1941-45, and director of organization at the Treasury, 1943-45. He was elected as M.P. (Conservative) for Bath, 1945.

Pitot Tube. Apparatus devised by a French scientist named Pitot for the measurement of the speed of moving fluids or of motion through fluids. It consists essentially of one tube with an open end facing the direction of the fluid's motion, and a second tube, also open to the fluid, but with the opening facing at right angles to the line of motion. Both tubes are thus subject to any steady static pressure on the fluid, and the first one is in addition subject to an added pressure due to the momentum of the fluid impinging on its open end. If a delicate pressure gauge is connected with the two branches of a Pitot tube so as to register the difference of pressure between them, the reading of the gauge is a measure of the speed of the impinging fluid, if the density of the fluid is already known.

A development of the Pitot tube, known as the pitometer, will test

the flow of water in water-mains and detect leakages. Pitot tubes, in conjunction with pressure gauges, are used in aeronautical engineering to measure the speed of currents in experimental work and the air speed of aircraft in flight.

Pitsea. Town of Essex, England. It is $26\frac{1}{2}$ m. E. of London, and has a rly. station on the main line to Southend. Built on a peninsula formed by creeks of the Thames, it is N.W. of Canvey Island. Pop. 3,414.

Pitt, Thomas (1653-1726). British merchant. Born at Blandford St. Mary, Dorset, July 5, 1653, he first figures in the East Indian trade in 1675, when the company's officials resented his presence on the Hooghli as an infringement of their monopoly. Disregarding orders to leave India, he established a house



*Thomas Pitt,
British merchant
After Kneller*

at Balasor, and bought extensively for export. In 1695 he joined the company's staff and was governor of Madras, 1698-1709, during which period he purchased for £20,000 the Pitt diamond, which he sold for £135,000 to the duke of Orléans. He was several times M.P. for Salisbury, Old Sarum, and Thirsk. In 1716 he was appointed governor of Jamaica, but resigned before leaving England, and died April 28, 1726. He was the grandfather of the earl of Chatham.

Pitt, William (1759-1806). British statesman. Younger son of the 1st earl of Chatham (q.v.) and his wife, Lady Hester Grenville, he was born at Hayes, Kent, May 28, 1759. A weakly child, he was educated at home until at 14 he entered Pembroke Hall, Cambridge. He read the classics, and knew a good deal of English literature and something of mathematics. Although he took his degree in 1777, he remained at Cambridge until 1780, when he was called to the bar.

At the general election in 1780, Pitt was an unsuccessful candidate for his university, but was almost at once chosen (Jan., 1781) for the pocket borough of Appleby. In parliament he associated himself with the Whigs, led by Shelburne. On Feb. 26, on Burke's motion for economical reform, he made his first speech, and as an advocate of parliamentary reform quickly became one of the

leading figures in the house. In 1784 Cambridge returned him, and he represented the university until his death.

In 1782, when Shelburne became prime minister, Pitt entered office as chancellor of the exchequer but the ministry lasted only nine months. Pitt declined to join the Fox-North coalition, and while Portland was premier he took his place among the opposition leaders, and visited France. But by Dec., 1783, the ministry was defeated, and Pitt at 24 became prime minister, the youngest in British annals. He himself took the office of chancellor of the exchequer, and, although some associates left him, he soon formed a ministry. He had to face a hostile majority in the commons, but the courage with which he did this heightened his reputation, and the country applauded him still more when, a



W.P.
After J. Hoppner, R.A.

poor man, he refused the rich sinecure of the clerkship of the pells. In April, 1784, when the general election took place, Pitt's supporters in the new house had a solid majority.

Pitt's long premiership divides itself into two periods, one of peace and one of war. From 1784 to 1792 his chief aim was to restore the economic prosperity damaged by the American war. He ordered the finances, established a sinking fund, backed the Eden-Vergennes free trade treaty with France, and, aided by a time of commercial expansion, made his name as a finance minister. These years were marked by the impeachment of Hastings, and the question of the regency. In 1791 the Canada Act

set up the two provinces of Upper and Lower Canada.

Pitt did not receive from his colleagues in the cabinet that support which premiers of a later age look upon as their unquestioned right. He suffered defeats in the commons, not always on minor points, as when his proposals for regulating the commercial relations between England and Ireland were rejected. He showed himself true to his early zeal for parl. reform although his proposals failed; and came out on the side of his friend Wilberforce in the cause of the slaves.

In 1789 the French Revolution opened, but as late as the end of 1792 Pitt did not believe it would lead his country into war. But the French Republic committed one aggression after another, and in 1793 Great Britain entered the struggle. From then Pitt was a war minister. His high courage was specially needed in 1797, when England was left to continue the fight alone, and the seamen mutinied; but the fleet was soon in action again and a new coalition was formed. In 1798 a rebellion in Ireland was crushed, and in 1800 came the union of the parliaments of England and Ireland. Pitt's Irish policy was to complete the union by granting civil liberties to the Roman Catholics. Some colleagues were hostile, but the decisive opposition came from the king, and Pitt resigned in 1801. For two years he hardly appeared in the house, but on May 16, 1803, he returned and favoured what amounted to a renewal of the war. When this came he was again called to the helm (May, 1804). He formed a fresh coalition, and, though the Austrians were beaten at Ulm, the victory of Trafalgar restored the fortunes of the Allies. Then came Austerlitz. On the news of this defeat—when he bade his friends "roll up that map, it will not be wanted these ten years"—he returned from Bath to London, and, already very ill, on Jan. 23, 1806, he died at his house in Putney. He was buried by the side of his father in Westminster Abbey. He never married.

Pitt ranks as one of the greatest of English statesmen and orators. Proud and reserved, he lived a lonely life, but his devotion to his country's interests was never questioned. As a war minister, sending out expeditions that were costly and valueless, and passing measures retarding the liberty of the people, he was not altogether successful, but with a courage that

never faltered he guided his country in a dark hour. As a financial reformer and as a figure in constitutional development he most merits applause. His private life was stainless, his only weakness being a fondness for port wine, while he shared his father's lofty freedom from all taint of pecuniary corruption.

Bibliography. Political Life, J. Gifford, 1809; The Age of Pitt and Fox, D. O. Madden, 1846; Lives, Lord Stanhope, 1862; Lord Rosebery, 1914; Life, and W. P. and the Great War, J. E. Rose, both 1934; George III and W. P., D. G. Barnes, 1939.

Pittacus (c. 652-569 B.C.). Ruler of Mitylene and one of the seven wise men of ancient Greece. A contemporary of Alcaeus and Sappho, he was largely responsible for the overthrow of the tyrant Melanchrus, and commanded the forces of Mitylene in the war with Athens. In 589 he was chosen ruler by the people of Mitylene, and after governing wisely for ten years voluntarily resigned.

Pitt Diamond. Gem found in India in the 17th century. It weighed 410 carats and was bought for £20,000 by Thomas Pitt, governor of Madras, who in 1702 sold it to the duke of Orléans, regent of France, for £135,000. The diamond, called the Great Pitt, was reduced by cutting to 137 carats and renamed the Regent. It was set in the French royal crown, but was stolen during the Revolution. When recovered it was placed in the crown of Charles X, and was later in the diadem of the Empress Eugénie. When the French crown jewels were dispersed by auction in 1887, this diamond was placed in the Louvre.

Pittenweem. Royal and mun. burgh and seaport of Fife, Scotland. It stands on the N. shore of the Firth of Forth, 9 m. S. by E. of St. Andrews, and has a rly. station. The chief building is the parish church, originally that of a priory founded here in the 12th century. The town was made a royal burgh in 1542. Fishing and fish curing are the chief industries, and there is a small harbour. Pop. 1,600.

Pitti Palace. Building in Florence, Italy, containing a famous collection of pictures. Designed in 1449 by Brunelleschi as a residence for Luca Pitti, chief magistrate of the city, it later became the palace of the grand duke of Tuscany, and was added to and improved by successive owners. Shell fire and explosions near by during German demolitions, Aug., 1944, did considerable damage to its roof and

windows; and the corridor linking it with the Uffizi gallery was destroyed. The second largest palace in Italy, it is built of rough-hewn stone, and stands on the left bank of the Arno, between that river and the Boboli gardens. The collection of paintings contains masterpieces of the Italian, Dutch, Spanish and English schools. See Florence; Raphael; Titian.

Pitt-Rivers, AUGUSTUS HENRY LANE FOX (1827-1900). British archaeologist. Born April 14, 1827, son of W. A. Lane Fox, he took up a military career, and rose to be lieutenant-gen., 1882. Inheriting estates from his great-uncle, George Pitt, Lord Rivers, he assumed his final name, 1880. His researches into the history of weapons led to a study of human invention, and the resulting collections, presented 1883, form the nucleus of the Pitt-Rivers museum, Oxford. He became F.R.S., 1876; vice-president of the Society of Antiquaries; president of the Anthropological Institute; and first inspector of ancient monuments. His work on prehistoric remains on his estates is described in Excavations in Cranborne Chase, 1887-96. He died at Rushmore, May 4, 1900. His grandson, George Henry Lane Fox Pitt-Rivers (b. May 22, 1890), was an anthropologist.

Pittsburgh. City and port of entry of Pennsylvania, U.S.A. The capital of Allegheny co. and the second largest city of the state, it occupies an advantageous position at the point where the Allegheny and Monongahela rivers unite to form the Ohio. It is served by the Pennsylvania, the Baltimore and Ohio, and several other lines of rly. The original city was built in the angle of the two rivers, but its limits have been greatly extended by the consolidation of several neighbouring boroughs, among them Union, W. and S. Pittsburgh, Allentown, Birmingham, E. Birmingham, and Allegheny.

Prominent public buildings of Pittsburgh include the Allegheny court house; the city hall; the exposition building; the U.S. arsenal; the Carnegie library and institute in Schenley Park, endowed by Andrew Carnegie in 1905; the Carnegie library of Allegheny; the 335-room Mellon institute, dedicated 1937 to industrial laboratory research; the S. C. Foster memorial building, built 1937, to the memory of the author of My Old Kentucky Home.

Pittsburgh university is housed in a 42-storey skyscraper. Other educational institutions are

Pennsylvania women's college, Pittsburgh academy, Duquesne university (formerly Pittsburgh college of the Holy Ghost), and the Carnegie institute of technology. Highland Park, 366 acres, contains zoological gardens and three reservoirs. The seat of a R.C. and a Protestant bishop, Pittsburgh has fine churches.

Commercial and industrial prosperity is due to the situation on a coalfield and close proximity to an important oil and natural gas producing region. One of the principal centres in the world for the production of iron and steel goods, Pittsburgh has numerous large blast furnaces and rolling mills. It turns out steel rails and bridges, engines, glass, bricks, cement, pottery, tobacco, cigars, electrical and astronomical appliances, and cork. In 1811 the first steamboat designed for western waters was built here, and since then shipbuilding has developed into a leading industry. Financially, Pittsburgh presents one of the greatest concentrations of U.S. wealth, largely (1948) under the control of the family founded by A. W. Mellon (*q.v.*).

Pittsburgh, 150 m. from the great lakes, and more than 200 m. inland from the sea, is a great river port, handling 30,000,000 tons of merchandise annually—more than the Panama canal. Barge traffic proceeds through locks along the Allegheny and Monongahela rivers, tapping coal and steel communities scattered through the states of Pennsylvania, Ohio, West Virginia, and Indiana.

Pittsburgh is the U.S. home of the unskilled, as Detroit is of the skilled, worker. Many Pittsburgh workers are foreign-born; its prosperous upper layer is of Irish and German origin, its less prosperous underlayer being Polish, Italian, and Yugoslav. Negroes form about

10 p.c. of the pop.; they here enjoy most civil rights, attending the state schools and Pittsburgh university in theoretical equality. The Courier, leading U.S. negro weekly, is published here. In 1754 the French erected Fort Duquesne on the present site of Pittsburgh. The following year the British under Gen. Braddock tried but failed to take the fort. They captured it in 1758, and built another fort which they named in honour of William Pitt, then British prime minister. Pittsburgh was incorporated as a borough in 1794, reincorporated in 1804, and in 1816 chartered as a city. In 1845 it suffered a disastrous fire. Pop. (1940) 665,384.

Pittsfield. City of Massachusetts, U.S.A., the co. seat of Berkshire co. It stands on the Housatonic river and is the gateway to the mountain-girt Berkshire valley, 41 m. N.W. of Springfield. Several rlys. run to Pittsfield, which has silk, woollen, and paper mills, foundries and machine shops, and manufactures of cotton, thread, paper, and pianos. At an alt. of over 1,000 ft., it is traversed by streams which afford industrial power. Settled in 1743, Pittsfield was incorporated in 1761 and became a city in 1891. Pop. 49,684.

Pituitary Body (Lat. *pituita*, phlegm). A small lobed gland, about the size of a hazel-nut, situated at the base of the brain. It is regarded as the master-gland among the ductless glands. These it influences through its secretions or hormones (*q.v.*). Extreme wasting or extreme fatness can result from disorder of one secretion; a well known enlargement of the bones from the disorder of another. Without the pituitary, life comes to an end within a few days. See Endocrinology.

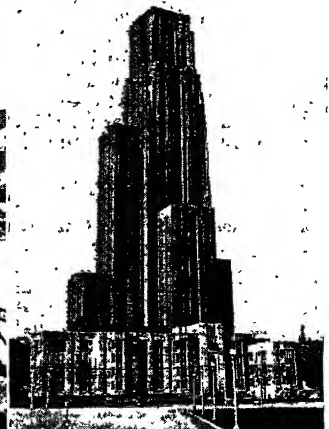
Pit-Village. Prehistoric settlement, mostly of the Neolithic and

the early metallic age. The transition from the Palaeolithic cave-dwelling (*q.v.*) to the Neolithic pit-dwelling is traceable at Campigny, France, in S. Russia, and in Holderness, Yorkshire, where excavations in the boulder-clay were sometimes 40 ft. long. Other sites reveal pits for storage and other domestic purposes beneath the flooring of wattled huts, long since perished. Similar structures are found among the Eskimo, on ancient settlements in N.Z., and in Hokkaido, Japan. See Hut Circle; Underground Dwellings.

Pityriasis (Gr., scurf, from *pityron*, bran). Name given to an affection of the skin, characterised by brown, bran-like patches. Though it has been attributed to the growth of a microscopic fungus, and also to toxic action, the actual cause is unknown. No internal treatment has any effect. A simple anti-itch lotion, *e.g.* lead lotion, allays the itch during the four weeks that the rash lasts.

Piura. N.W. maritime dept. of Peru. Partly a rainless desert, it yields petroleum, salt, sulphur, and soda. Its area is 15,190 sq. m. Pop. 408,605. Piura, the capital, stands on the Piura river, 20 m. from the coast, and 40 m. by rly. E. of Paita. The first permanent settlement founded by Pizarro, it is a cotton mart and exports petroleum and cotton. Pop. 20,000.

Pius. Name of twelve popes, of whom the more important are noticed separately. Pius I, the 9th pope according to the earliest lists, whose pontificate was from about 140 to 154, is venerated as a saint and martyr, his festival being kept on July 11. Pius III, who reigned for a few weeks in 1503,



Pittsburgh, Pennsylvania, U.S.A. Left, general view of the city. Right, University building known as the "cathedral of learning." It is 41 floors high and accommodates all the students of the university

was a Piccolomini, and nephew of Pius II. Pius VIII, pope 1829-30, was the candidate of the French and Austrian monarchies; he recognized the revolution which made Louis Philippe king of France.

Pius II (1405-64). Pope 1458-64. Aeneas Sylvius Piccolomini was born at Corsignano, Oct. 18, 1405, of a noble but impoverished Sienese family. He studied at the university of Siena, and as private secretary to the bishop of Fermo attended in 1432 the council of Basel, where he joined the faction opposed to Pope Eugenius IV. Later he entered the service of Cardinal Albergati, who in 1436 sent him to Scotland.

Returning to Basel, he took an official part in the election of the anti-pope Felix V, 1439, and became his secretary. At Vienna he entered the service of the emperor, Frederick III, and having deserted the anti-pope, was in 1445 formally reconciled to Eugenius IV. In 1446 he was ordained, in 1447 was made bishop of Trieste, in 1450 bishop of Siena. Given the red hat in 1456, he was elected pope in succession to Calixtus III. To unite Europe against the Turkish menace, he summoned a meeting at Mantua, where in 1460 he issued his bull *Execrabilis*, in which appeals from the pope to a general council were condemned. The last act of the pope's life was an attempt to lead in person a crusade against Islam. A man of letters and humanist learning, Pius II died at Ancona, Aug. 14, 1464. See Piccolomini.

Pius IV (1499-1565). Pope 1559-65. Born at Milan of a branch of the Medici family, Giovanni Angelo studied at Pavia and Bologna, and in his 28th year gave up law to take orders. He was employed in various offices under Clement VII, Paul III, and Julius III, and was made cardinal by Paul III. In 1559 he was elected pope. On his summons the council of Trent reassembled for the third time, Jan., 1562, and sat until Dec. He died Dec. 9, 1565.

Pius V (1504-72). Pope 1566-72. He was born Jan. 17, 1504, a Lombard named Michele Ghisleri. Entering the Dominican Order, he was ordained, was made bishop of Sutri, 1556, inquisitor general and cardinal, 1557, and elected pope, 1566. He excommunicated Elizabeth and encouraged Mary Queen of Scots. He was no less active in strengthening the work of the Inquisition, and in opposition to the Turks, sending forces to the battle of Lepanto. He died

May 1, 1572, and was canonised in 1712, his festival is on May 5.

Pius VI (1717-99). Pope 1775-99. Born at Cesena, Dec. 27, 1717, he was called Giovanni Angelico Braschi. From 1755 until his election as pope he held various official positions at Rome. His reign was a continuous struggle first with the Catholic rulers of Austria, Spain, and Naples, and later with Napoleon. At the French Revolution Pius refused to acknowledge the civil constitution of the clergy, and France annexed the papal territory at Avignon. After surrendering large portions of the papal states to Napoleon, 1797, the pope declined to acknowledge the Roman republic, set up in 1798. Carried an exile to France, he died at Valence, Aug. 29, 1799.

Pius VII (1740-1823). Pope 1800-23. Luigi, son of Count Scipione Chiaramonti, was born at Cesena, Aug. 14, 1740, and after some years as a Benedictine monk was made bishop of Imola and cardinal in 1785. He was elected pope in 1800 after a three months' conclave. The



Pius VII,
Pope, 1800-23
After Lawrence

great event of his reign was the concordat with Napoleon I, 1801. Pius was subsequently made prisoner by Napoleon, 1809-14. By the aid of Consalvi at the congress of Vienna he obtained the restoration of the papal states. He also re-established the Jesuit Order, 1814. He died Aug. 20, 1823. See Concordat; Consalvi. consult also Life, M. H. Allies, 1897.

Pius IX (1792-1878). Pope 1846-78. Born at Sinigaglia, May 13, 1792, his name was Giovanni Mastai-Ferretti. Ordained in 1819, he was made archbishop of Spoleto, 1827, and was given the cardinal's hat in 1840. He



Pius IX,
Pope, 1846-78

was elected pope on the death of Gregory XVI by the faction which favoured liberal reforms, the Austrian veto on his election arriving too late. His first act was a general amnesty to all political prisoners. This was followed by a constitution for the

papal states, which was a direct cause of the *risorgimento* in the rest of Italy during 1848; but on his declaration against war with Austria a series of riots in Rome ended in the pope's retirement and the establishment of a republic. Restored by French troops, 1850, Pius saw the annexation of the papal states and of Rome to the kingdom of Italy in 1870. That year he convoked the Vatican Council which declared the pope speaking *ex cathedra* to be infallible in faith and morals—an event which made Pius IX familiar under his Italian name Pio Nono throughout the world. He died Feb. 7, 1878. Consult Lives, A. O. Legge, 1875; T. A. Trollope, 1877.

Pius X (1835-1914). Pope 1903-14. Born June 2, 1835, at Rieti, Treviso, he was the son of a postman; his name was Giuseppe Melchiorre Sartorio. Educated in the seminary of Padua, he was ordained, 1858. He was made canon of Treviso, 1875, bishop of Mantua, 1884, and raised to the cardinal archbishopric of Venice, 1893. On the death of Leo XIII he was elected pope by 55 votes out of 60. The pontificate of Pius X was distinguished for the attention given to increasing the discipline of the church and suppressing modernism. In his encyclicals of 1907 and 1910 the whole system of modernism was condemned. He died Aug. 20, 1914. There are Lives by F. A. Forbes, 1918; R. Bazin, 1938.

Pius XI (1857-1939). Pope 1922-39. The son of a silk merchant, he was born at Desio, near Milan, May 31, 1857, his name being Achille Ratti. Ordained in 1879, he became in 1888 assistant to the prefect of the Ambrosian library, and succeeded him in 1907.

Ratti was a mountaineer, and his Climbs on Alpine Peaks was published in English in 1923. From 1910 he was assistant to the prefect of the Vatican library, until in 1918 he went to Poland as nuncio. In 1921 he was made cardinal and archbishop of Milan.



Pius X,
Pope, 1903-14



Pius XI,
Pope, 1922-39

and was rather unexpectedly chosen pope on Feb. 6, 1922. He showed a burning desire for world peace; in 1929 he negotiated the Lateran treaty with fascist Italy, and later signed a concordat with Nazi Germany, but lost no opportunity to condemn the pagan spirit evident in both countries. He died Feb. 10, 1939. Several biographies include one by W. and L. Townsend, 1930.

Pius XII (b. 1876). Pope. Born near Viterbo, March 2, 1876, of a noble Italian family, his

name was Eugenio Pacelli. Soon after ordination in 1899 he was enrolled in the congregation of ecclesiastical affairs extraordinary, and helped Cardinal Gasparri to



Pius XII,
elected Pope, 1939

compile the *Codex Juris Canonici*. In 1917 he went as nuncio to Munich, and in 1920 was appointed to Berlin, but did not proceed there until the conclusion of the concordat with Bavaria in 1924. Cardinal in 1929, next year he became papal secretary of state. He took part in negotiations leading to the Lateran treaty with Italy and the concordat with Nazi Germany. In 1936 he visited the U.S.A. His election to the papacy, March 2, 1939, came as a surprise inasmuch as he had never had a cure of souls. There was criticism of his tolerance of the Italian attitude to the Second Great War; but he was tireless in efforts on behalf of R.C. war victims on both sides. After the war he had to face bitter attacks on his Church in Communist-dominated countries.

Pizarro, FRANCISCO (c. 1475-1541). Spanish conqueror of Peru. The natural son of Colonel Gonzalo Pizarro, he was born at Trujillo, entered the Spanish military service early, fought under Gonsalvo de Cordova in Italy, and then sought fresh fields for his energies in the newly discovered lands in the Far West.

Fired with ambition by the conquest of Mexico (see Cortés), 1520, Pizarro conceived the idea of conquering Peru, the unexplored empire of the Incas, and in 1526 went with a fellow adventurer, Almagro, on a first voyage of investigation. They received little countenance from the governor of Panama, but Pizarro learnt that

rumours which had reached Spain were true, that there actually existed a highly organized empire, immensely rich, and enjoying an advanced civilization. The next

step was to obtain authority for the conquest from Charles V. This accomplished, Pizarro sailed from Spain on Jan. 19, 1530, and from Panama on Dec. 28, 1531, with some 180 men, armed with muskets, and 37 horses.

Pizarro landed in May, 1532, at Tumbez. The crown of the Incas had been seized by Atahualpa, who had deposed the legitimate ruler, Huascar. In Nov. Pizarro reached the town of Cajamarca, which he found empty, while he learnt that Atahualpa was in the neighbourhood with an army of 40,000 men. To attack him openly with fewer than 200 was out of the question, but Pizarro posted his men and his two culverins carefully in Cajamarca, and enticed Atahualpa to visit him in state. At a given signal the Inca king was seized, the Spanish guns opened fire, and the handful of Spanish horse threw themselves between the king's company and the line of communication with the main army. The ensuing fight was merely a massacre. Atahualpa submitted and promised the Spaniards a vast store of treasure if they would restore to him the authority under which they were now professing to act. Nevertheless, fearing internal revolution, he gave orders for the execution of his brother Huascar. Pizarro seized his opportunity; Atahualpa was denounced and executed, Aug., 1533; while another member of the royal family was set up as a puppet emperor.

Almagro was now arriving with reinforcements. The empire was partitioned, Pizarro taking the northern governorship while Almagro went south and made himself master of Chile. No effective resistance was offered to the conquerors until an Indian insurrection broke out in 1536. It was crushed next year by the aid of Almagro, between whom and Pizarro there then arose a contest for supremacy. The latter's brothers defeated and killed Almagro in 1538, but three years



Francisco Pizarro,
conqueror of Peru
Engraving by J. Brown
from a painting in the
Viceroy's Palace, Lima

later Almagro's followers took their revenge, and Pizarro was surprised and assassinated on June 26, 1541. Apart from valour and enterprise, his personal qualities seem to have been odious. See Atahualpa; Lima; *consult* Life, A. Helps, 2nd ed. 1869.

Pizzicato (It., pinched). Effect produced on string instruments by plucking the strings with the fingers, the resultant sound having a dry and evanescent quality of tone. In pizzicato tremolando, invented by Elgar, chords are thrummed with three or four fingers across the strings. See Harp.

Place, FRANCIS (1771-1854). British reformer. Born of working-class parents in London, Nov. 3, 1771, he was apprenticed to a leather breeches maker, and in 1793 organized an unsuccessful strike. Secretary to various trade clubs, he used his leisure for self-education, and became an admirer of Bentham and Godwin. In 1799 he opened a tailor's shop at Charing Cross. Agitation by Place more than anyone brought about the repeal in 1824 of the Combination Acts which forbade trade unions. In 1831 Place worked with Joseph Parkes on preparations for the expected civil war, but the passing of the Reform Bill deprived him of political influence. He died Jan. 1, 1854. A Life, by G. Wallas, appeared in 1898.

Place Names. Geographical and topographical designations. Their study, long the sport of amateurs, was hardly placed on a scientific basis until the 20th century. A branch of philology, it is a valuable aid to the historian and ethnologist, elucidating the movements and boundaries of nations and tribes.

While in Germany place names show the limits of Celtic and Slav settlement, in Spain we can trace the Iberians, Celts, Phoenicians, Romans, Goths, and Arabs by such names as Bilbao, Sigüenza, Cadiz, Zaragoza, Burgos, and Guadalquivir respectively. In England a few river names are probably pre-Celtic, but most are Celtic, e.g. Avon, Exe, Dove, Adur, Wey, Thames, etc., as are many names of hills, Penygant, Brown Willy, Helvellyn, etc., and towns like London, Dover, York.

The great majority of English names of towns and villages contain the name of the man or family that founded the settlement, e.g. Brighton, Brihtelm's stone; Hildersham, Hilderic's home; Hoxton, Hocca's enclosure. Family or tribal names end in the

patronymic *-ing*, as in Dorking, Kettering. The names of saints, exceedingly common in Celtic countries, occur rarely in England apart from Cornwall. Most other remaining English place names are plain prosaic descriptions of the locality. Among the commonest endings are *caster*, *cester*, *chester*, Roman fortress; *ton*, enclosed settlement; *ham*, homestead (sometimes pasture); *wick*, *wich*, village; *bottle*, building; *stead*, place; *thorp*, *trop*, village; *worth*, *worthy*, *wardine*, holding or farm; *stow*, place; *ern*, house; *hope*, enclosure, also hollow; *hall*, *haugh*, river meadow; *holm*, *lea*, *ley*, meadow; *hurst*, wood; *den*, wooded valley; *combe*, valley; *borne*, *bach*, *beck*, brook; *bergh*, *don*, *low*, *law*, hill; *or*, *over*, *er*, bank; and words like wood, field, ford, stone, cot.

Norse names end in *by*, *thorp*, village; *toft*, farm; *argh*, *ergh*, shelter; *thwaite*, clearing; *with*, wood; *dale*, valley; *beck*, *gill*, stream; *force*, waterfall; *keld*, *child*, spring; *wick*, creek; *forth*, fjord; *holm*, *y*, *ay*, island; *fell*, mountain; *how*, mound. The Norman-French element is represented by such names as Bungay, *bon gué*, good ford, and Gram-pound, *grand pont*, great bridge. The name of the Norman owner was often added to that of the village, e.g. Hucknall Torkard. See Name.

Placenta (Lat., cake). Mass of tissue adherent to the inside of the uterus or womb and connected, for purposes of nutrition and excretion, by the umbilical cord with the foetus or growing organism. It is also called the after-birth from its being expelled from the womb after childbirth.

Placentia. Seaport of Newfoundland. It stands on the east side of Placentia Bay, an opening on the S. coast, 75 miles long. See Newfoundland.

Placer Deposits. Mineral deposits formed as a result of erosion. The most common valuable constituents found in placers are gold, cassiterite (tin oxide), columbite-tantalite, zircon, monazite, rutile, diamond, and other gemstones. Minerals frequently associated with these include garnet, staurolite, ilmenite, magnetite, etc. All such minerals are resistant to chemical erosion and possess high specific gravity, for they are concentrated by the removal of lighter and more easily decomposed minerals. According to their mode of origin they are classified as alluvials, eluvials, marine, and

beach placers. They may be further subdivided into recent and fossil placers, the later being formed by similar processes operative in distant geological times. Placer deposits are worked by sluicing, hydraulicking, or dredging in Malaya (tin), Ceylon (gemstones), Australia (rutile-monazite-zircon), West Africa (tin and diamond), America (gold), and elsewhere. The famous gold deposit of the Rand, South Africa, is thought by some to be an old fossil placer deposit. See Gold; Hydraulicking.

Placoid Fishes (Gr. *plax*, flat plate). Name sometimes given, because of the flat nature of their scales, to the Elasmobranchs, a group of cartilaginous fishes which includes the shark, dog-fishes, and rays. See Elasmobranch.

Plagioclase. An important series of rock-forming minerals. The plagioclase feldspars constitute an isomorphous series ranging from sodium aluminium silicate (albite) to calcium aluminium silicate (anorthite); the intermediate members oligoclase, andesine, labradorite, and bytownite, contain various proportions of the two end-members in solid solution. They may be readily identified by means of their optical properties and are valuable index minerals in the classification of igneous rocks, e.g. albite in granites (acid rocks), anorthite in gabbros (basic rocks), and so on. Feldspars appear also in many metamorphic rocks, such as gneiss and schist, and also in sedimentary arkoses and feldspathic sandstones.

Plague (Lat. *plaga*, stroke). Term formerly applied to epidemics of various diseases, but now restricted to that caused by the *bacillus pestis*. It is in the first instance an infection of rats, and is transmitted to man on the death of an infected rat. Fleas, which have bitten the rat, bite a human being, and within a few days the victim develops headache, dizziness, blurring of speech, great mental prostration, and a staggering gait. The disease may then take one of two courses. In the bubonic type buboes or tender swellings appear, commonly in the groin or axilla. These persist and are very painful; but if they burst about the fourth day, recovery usually occurs. If they do not burst, the patient rapidly passes into coma and dies. The other course is septicæmic, in which the manifestations are more violent, in spite of the lower temperatures and the absence of buboes. This variety is almost always rapidly fatal. If the

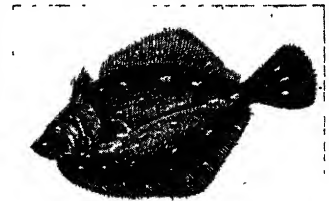
buboes occur in the lung the disease is called pneumonic plague and may be transmitted by drop-let infection from man to man.

Plague is one of the oldest diseases. In 1348 there was a great outbreak in England, called the black death. In the plague of London (1665) vast numbers died. These epidemics gave birth to the first ideas of isolation for infectious disease, and quarantine was first introduced in Venice.

Modern treatment consists in isolation and careful nursing. A serum prepared from horses has been used, as have the sulphonamides and penicillin. Prevention lies in the control of plague-bearing animals, particularly rats. See Black Death; Great Plague.

Plaques of Egypt. Ten plagues brought upon the Egyptian Pharaoh and his people by Jehovah, when the Israelites were in bondage in Egypt (Ex. 7-12). The plagues were turning of the waters of the Nile to blood; swarms of frogs, of gnats, of flies; affliction of cattle with pestilence; of man and beast with boils and blains; havoc by thunder and hail; swarms of locusts; dense darkness; and, the last and most terrible of all, the death of the first-born of both man and beast.

Plaice (*Pleuronectes platessa*). Important food fish of the family Pleuronectidae. A native of the Atlantic and North Sea, from Iceland and N. Europe to the Bay of Biscay, but not on the American coasts, it is also sometimes found in the Mediterranean. Of a long, oval form, the body of the plaice is



Plaice viewed from above, showing the characteristic orange spots

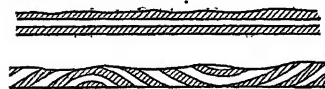
strongly compressed from side to side, and fringed with the long dorsal and ventral fins, which extend almost from head to tail. The left side is white without any markings, but the right, or upper side, is fully coloured brown, on which are scattered spots of orange or red.

Beginning life as a "round" fish, like the cod, the young plaice soon takes to lying on the bottom on its left side, and the left eye travels round to the right side. The young

flat-fish affects sandy shores in shallow water, going deeper as it gets larger, until as an adult it seeks the spawning grounds in from 10 to 40 fathoms. It is adult when from 2½ to 3 years old, and 10 to 12 ins. long, but if it escapes the trawl may grow to 24 to 30 ins. Its principal food consists of small molluscs, sand stars, and marine worms. The average egg-production of a female plaice is a quarter of a million, though nearly twice this number have been recorded. The eggs, which measure ⅓ of an inch, float a little below the surface. *See Fisheries.*

Plaid (Gael. *plaid*, blanket). Strip of cloth two yards broad and four yards long, used as a garment by Scotsmen, and known as the *breachan feilidh*. *See Highlands* (Highland Dress); Tartan.

Plain (Lat. *planus*, flat). Area of flat or approximately flat land. Plains may be classified, according to their formation, as of accumulation or of erosion.



Plain. Sectional diagrams illustrating (top) accumulation, and (below) formation of plains of erosion

Plains of accumulation are built up of sediment which forms horizontally bedded layers of rocks, so that in these plains the surface corresponds to the structure. The sediment brought down by rivers, or produced by wear and tear of the coast, is spread over the floor of the ocean bordering the land masses. An uplift of the land will raise accumulated deposits above sea level, and produce coastal plains like those stretching along the N. American coast from Mexico to the Hudson River. In the interior of the same continent are vast prairie plains, composed of limestone built up of sediment deposited on the bed of the ancient sea formerly separating the western highlands from the eastern highlands. Uplift raised these deposits and formed plains. The vast S. American lowlands of the Plate, Amazon, and Orinoco valleys, the steppes of Hungary, Russia, and W. Siberia, have all been formed in this manner. Other plains of accumulation are chiefly associated with rivers, many of which accumulate sediment in the form of deltas.

Plains of erosion do not necessarily correspond in surface and in geological structure, for they are frequently ancient folded and contorted highland regions which have

been reduced to rough plains, or peneplains (*q.v.*), by erosion. In the Baltic or Hudson Bay areas there are good examples of plains of erosion. Sometimes they are covered by alluvial deposits.

Plainfield. City of New Jersey, U.S.A., in Union co. It is 24 m. W.S.W. of New York, and is served by the Central Railroad of New Jersey. Now a small manufacturing centre and a residence for New York business men, it was in the 18th century a home of dissident religious sects. It is still the headquarters of the Seventh Day Baptists. Founded in 1847, Plainfield became a city in 1867. Pop. 37,469.

Plainsong, PLAIN-CHANT, OR CANTO FERMO. Ancient system of Gregorian church music. It proceeded by contrapuntal movement in notes of equal length, representing what is now known as the first species of counterpoint. It was written in the eight modes, and on four-lined staves, the notes employed being the long, the breve, and the semibreve. The canto fermo, generally in the tenor part, was the foundation on which the counterpoint was built, though each part was supposed to be of equal interest. The form is still used in Roman Catholic and high Anglican churches, chiefly, however, in the solo verses sung by the officiating celebrant, without contrapuntal additions. *See Gregorian Chant.*

Plain Tales from the Hills. Volume of short stories of Indian and Anglo-Indian life by Rudyard Kipling, first published in Allahabad in 1887. Most of the tales had previously appeared in the Lahore Civil and Military Gazette. It was the first volume of his stories to be issued in book form.

Plaintiff (Fr. *plaintif*, one who laments, complains). In English law, like pursuer in Scots law, the term describes the actor, or person who brings another, called the defendant (in Scotland the defender), into court, seeking relief against him. The plaintiff in a divorce action is called the petitioner. *See Trial.*

Plasterers' Company, THE. London city livery company. Existing as a guild in earlier times, it received its first charter March 10, 1501. The hall at 23, Addle Street, Aldermanbury, E.C., destroyed by fire in 1666, was rebuilt by Wren. The office is 6, Raymond Buildings, W.C.1.



Plasterers' Company arms

Plaistow. District of Greater London. In the co. of Essex, and part of the co. bor. of West Ham, it is 4½ m. by rly. from Fenchurch Street. At the beginning of the 19th century a small village, with large tracts of marshland stretching to the Thames, it is now a residential and industrial suburb, and has chemical, engineering, and other works. Here are the West Ham fever hospital, 1880, and the Y.M.C.A. building (a war memorial 1921), the parish church of S. Mary, S. Mary's hospital (1888), and the grammar school (1926). Among the famous people at one time resident in the neighbourhood were Edmund Burke, Dick Turpin, Dr. Dodd, the forger, and John Curwen, the originator of tonic solfa notation in music. A former meeting house of the Society of Friends here was attended by, among others, Elizabeth Fry. Pop. 58,631. There is another Plaistow, W. of Sundridge Park, in Kent, and one in West Sussex.

Planarians (Tricladida). Sub-order of Turbellarian worms. Of elongated, flat, or cylindrical form, covered with vibratile cilia, and with the mouth near the middle of the underside, they are all carnivorous, feeding upon other worms, molluscs, or insects. There are three families—*Maricola* (marine); *Paludicola* (fresh-water); and *Terri-cola* (land). The *Maricola* are broad and leaf-like, often brightly coloured, and as much as 6 ins. long, and may be found gliding over seaweeds or swimming by means of their cilia. A familiar example of the fresh-water forms is a small, black species (*Polycelis nigra*), abundant in stagnant water, ½ to 1 in. in length, popularly regarded as a young leech. A remarkable example of the land planarians (*Bipalium kewense*) was discovered in Kew Gardens some years ago, to which it had been introduced accidentally with tropical plants. It was 6 ins. or more in length, and could extend to 18 ins. Getting a portion of a large worm into its mouth, it stretched its entire integument over its victim, the operation taking from one to five hours; and the meal supported it for several months. *See Platyhelminthes*; Worm.

Planché, JAMES ROBINSON (1796–1880). British dramatist and antiquary. Born in London of Huguenot ancestry, Feb. 27, 1796, he achieved some success at the age of 22 with a burlesque, *Amoroso, King of Little Britain*, produced at Drury Lane. Later he wrote, translated, or adapted for the stage

over 150 pieces, largely burlesques. In 1854 he was made *Rouge Croix*, and *Somerset Herald* in 1866. Among his works, apart from dramatic writings, are *History of British Costume*, 1834; *The Pursuivant of Arms*, 1852; *The Conqueror and His Companions*, 1874; *Cyclopaedia of Costume*, 1876-79. He died May 30, 1880.

Planchette. Small wooden tablet, usually heart-shaped, mounted on three legs. One of these is a



Planchette, as employed in automatic writing

pencil and the others terminate in small wheels, the whole being so contrived that, when placed on a sheet of paper, it moves at the slightest impulse, and the pencil makes marks. It is frequently employed in experiments in unconscious muscular movement, and by spiritualists as a medium for communication with the unseen world. Two persons place their fingers lightly on the planchette, keeping their hands still and their minds passive, and the instrument will usually begin to move and often trace words and sentences. See *Spiritualism*.

Planck, Max (1858-1947). A German physicist. Born at Kiel, April 23, 1858, he was educated at Munich and Berlin universities, and in 1885 became professor of physics at Kiel. Five years later he went to Berlin as professor extraordinary, and in 1892 was appointed to the chair of experimental physics. He specialised in thermodynamics and radiation and in 1900 published a paper *On the Distribution of Energy in a Normal Spectrum*, which laid the foundation of his quantum or "packet" theory. This work provided the basis of Einstein's photoelectric law (1905) which explained the transfer of energy from light to electrons. Planck's deductions regarding electronic discharge, which suggested that intensity of radiation does not affect the energy of an electron, but only the number of electrons emitted, was in 1903 proved correct through practical measurements made by Rutherford and Geiger, and led to Bohr's quantum theory of spectra.

These theories exercised an influence on modern physics comparable only with those of Einstein. Planck postulated the view, incorporated in the quantum theory (*q.v.*), that energy is not continuous and in many respects resembles the behaviour of particles rather than force. He suggested that energy was radiated in indivisible units; and to these units the term *quanta* is now applied. For the determination of quanta he formulated the constant h , or Planck's constant (*v.i.*).

In 1912 he was permanent secretary to the Prussian academy of science, and in 1913 rector of Berlin university. Awarded the Nobel prize for physics in 1918, he received the Royal Society's Copley medal in 1929. In 1930 he became president of the Kaiser Wilhelm association. He came to England in 1946 for the Royal Society's Newton celebrations, and died in Berlin, Oct. 4, 1947. The British military govt. in Germany announced the formation of the Max Planck society to replace the Kaiser Wilhelm association.

Planck's Constant (h). Fundamental atomic constant having the value 6.622×10^{-27} erg. sec. The energy (E) conveyed by a quantum or photon of radiation is equal to the product of the frequency (ν) of the radiation and Planck's constant, i.e. $E = h\nu$.

Plane (Lat. *planus*). Word meaning flat, level, or even. In aeronautics it is used as a contraction for aeroplane, and also for the wing surfaces of an aeroplane.

In mathematics, plane geometry is concerned with the geometry of plane figures, i.e. figures which lie wholly in surfaces determined by any three points not in a straight line. In ballistics, the plane of departure is the imaginary line taken by a projectile as it leaves the firearm, and is a continuation of the line of departure. The plane of fire is the vertical plane through the tangent to the direction of motion of the projectile at the moment it leaves the muzzle.

The plane of sight is the vertical plane through the line of sight, also the lateral plane through the line of sight. To describe

the adjustment of a telescope in such a manner that the line of sight or optical axis is exactly perpendicular to the axis of movement, the term *plane of collimation* is used. The plane of symmetry is a mineralogical term to describe the condition where two halves of a crystal stand in mirror-image relation to each other. A symmetry plane is revealed by X-ray diffraction photography; the maximum number of planes possessed by any one crystal is nine. The plane of the ecliptic is that of the earth's orbit, and when sun, moon, and earth are all in this plane an eclipse occurs.

Plane (*Platanus*). Small genus of large trees of the family *Platanaceae*, natives of the N. temperate regions. They attain a height of 70 to 90 ft., with a trunk circumference of 10-12 ft., which is occasionally exceeded greatly. The large alternate leaves are palmately divided into five or seven toothed and sharply pointed lobes, and the dilated base of the leaf-stalk is hollow, fitting over the resting-bud of next year's shoot.

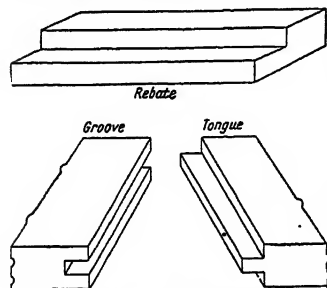
The flowers are simple, without sepals or petals, and the sexes separate; they are clustered in spherical heads, the male heads on one branch, the females on another.



Plane. Fine specimen of this tree. Top, left, fruit of London plane and, right, leaf

The fruits are closely packed in spiky balls which hang on long strings through the winter and disintegrate in spring. A peculiarity of the tree which helps it to thrive in soot-laden atmospheres is its habit of throwing off the outer layers of its bark in large or small thin flakes, showing yellow patches of newer bark. The Oriental plane (*P. orientalis*) was introduced to England from the Levant at some date previous to 1548, and the Western plane (*P. occidentalis*) from Virginia about 1640. The maple-leaved plane (*P. acerifolia*) is believed to be a hybrid between the two, originating in the Oxford botanic garden about 1670. The wood of *P. orientalis* is used for carpentry and cabinet work, and is susceptible of a high polish; but that of *P. acerifolia* is of less value, being liable to warp.

Plane. Woodworking tool, formerly used exclusively for flattening surfaces. During the Middle Ages the adze was usually employed for this, planes being rare and coarse in their working. Flat surface planes have become perfected and are in considerable variety, making shavings from the coarsest to the finest. The "trying" plane makes fine shavings where precision is required; the "smoothing" plane, finely set, is for finishing flat surfaces. There are many planes other than the flat



Plane. Diagram illustrating three types of planing. Grooving, left; tonguing, right; and rebate, above

surface type. Wooden moulding planes each make one pattern of moulding. Rebate, shoulder, and filister planes make narrow flat surfaces to a lower level. A range of grooving planes includes those with fixed fences, movable fences, and the plough (*q.v.*) or plow. Tonguing planes make "tongues," which are the counterparts of grooves. Universal and multiple planes are highly complicated metal tools.

Planer. Power-driven woodworking machine for planing flat surfaces. In all types long cutting

irons are fitted into steel cylinders which revolve at great speed. The wood is passed over a steel table, across the centre of which the cutters protrude. If the material being worked is passed over the cutters by hand, the machine is an overhand planer; if the wood passes under rollers, the machine is a panel planer. The usual procedure is to pass one side of the rough board over the overhand. The wood is made as flat on one side as the board will allow, and then passed through the panel planer, so that the board comes out to a gauged thickness. The "four-cutter" and the "five-cutter" are other types of planing machines; the latter makes mass-produced mouldings for carpentry, joinery, and cabinet work.

Planet (Gr. *planētēs*, wanderer). Name given to the chief of the solid bodies that revolve around the sun. Asteroids or planetoids and meteors are not usually included. The planets are Mercury, Venus, Mars, Earth, Jupiter, Saturn, Uranus, Neptune, Pluto.

In the solar system the planets are generally divided into two groups, the inferior planets, those between the earth and the sun, and the superior planets, those farther away from the sun than the earth. All planets travel round the sun in an anti-clockwise direction, viewing the system from the N., and all orbits are elliptical. The plane in which the earth revolves is known as the plane of the ecliptic, and all the other planets revolve in planes which make only small angles with the ecliptic plane.

The relative sizes and distances of the planets may be represented by an analogy in which the sun is a globe 2 ft. in diameter, Mercury a grain of mustard seed 164 ft. away, Venus a pea in an orbit of 284 ft., the earth a pea 430 ft. distant, Mars a pin head 654 ft. away, Jupiter an orange at a distance of half a mile, Saturn a smaller orange four-fifths of a mile away, Uranus a small plum 1½ m. away, Neptune a larger plum at 2½ m., and Pluto a pea at a distance of 3 m. The earth is the densest of all planets, Saturn being only one-eighth, and Uranus one-quarter, as dense. The density of the earth is about 5½ times that of water.

In astronomical tables, almanacs, etc., symbols are given to the various planets and the sun and moon for convenience of tabulation, etc. These symbols are: Mercury, ☿; Venus, ♀; Earth, ☾;

Mars, ♂; Asteroids, ① ② ③ according to the order of their discovery; Jupiter, ♃; Saturn, ♄; Uranus, ♅; Neptune, ♆; Pluto, ♇.

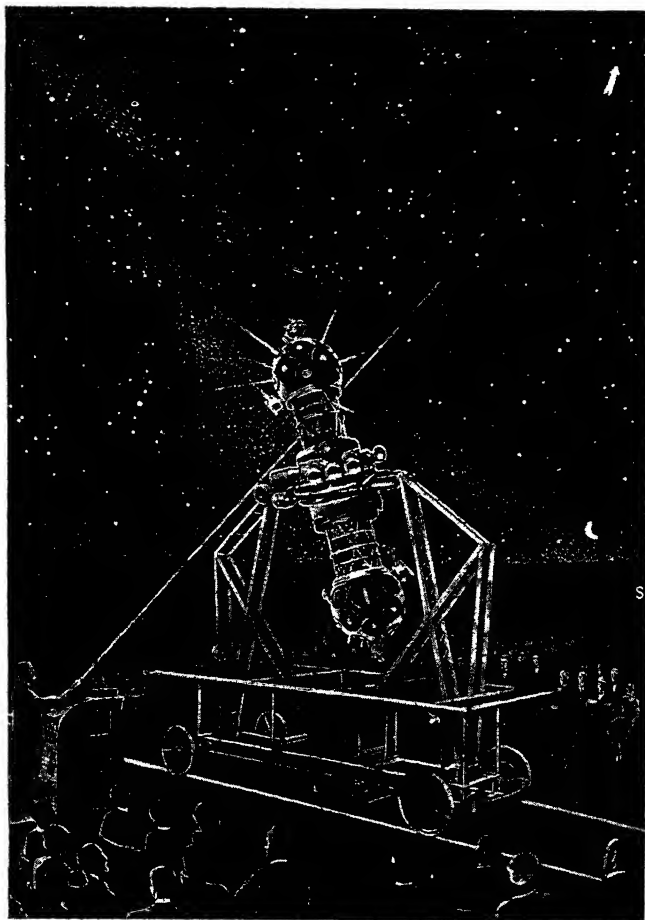
There is considerable uncertainty whether there are other planets not yet discovered. The irregularity of movements of Mercury caused Leverrier to postulate an intra-Mercurial planet (*q.v.*), but the anomalies have since been otherwise explained by the theory of relativity. Planets beyond Pluto may exist, but their perturbing effects on Neptune or Pluto are not apparent.

The origin of the planets is still in dispute. The sun's planetary system may not be unique, as in 1943 irregular movements of two near by stars were discovered, suggesting that large planets may revolve round them. See Asteroids; Astronomy; Nebular Hypothesis; Solar System; Sun; and the articles on each of the planets.

Planetarium. A device for simulating the appearance and motions of the heavenly bodies. A working model of the Copernican system was designed by Huygens and made in 1682, but this kind of instrument is now called an orrery (*q.v.*). A much more elaborate structure, built by Zeiss in 1913 for the Munich museum, carried the observer in a cage round a track representing the earth's orbit and allowed him to look out on moving planets and fixed stars represented by electric bulbs. In the modern Zeiss planetarium, as installed in many Continental and American cities, all the heavenly bodies are simulated by images projected on the inside of a dome 50 ft. or more in diameter.

The projector, which looks like a large dumb-bell, turns on a vertical axis to reproduce diurnal motion, on its own long axis for annual and precessional motion, and on a horizontal axis to allow for change of latitude. Different speeds can compress a year into 3 min., 1 min., or 5 sec. The fixed stars visible to the naked eye (some 9,000 in all) are projected through minute holes in copper plates, the milky way through a photographic negative. There are individual projectors to allow for the extra brightness of Sirius and the fluctuations of the Cepheid variables.

The motions of the planets are arrived at by mounting their projectors on working models of the solar system, and arranging for the beam to shine always in the direction away from the earth. The moon projector has a shutter device for reproducing phases. The



Planetarium. A lesson in astronomy at the Zeiss Projection Planetarium in New York. The speaker at his switchboard, holding a luminous pointer, lectures to his audience on the wonders of the heavens. The arrow thrown on the dome directs attention to the specific body about which the lecturer is talking.

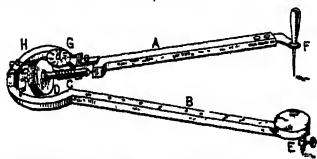
stars are dimmed at rising and setting, and a horizon glow is added. The illusion of the night sky is remarkably complete; when the sun appears, however, it is relatively faint, so that the stars can still be seen in their daytime positions.

Planets. THE. Musical composition by Gustav Holst. This brilliantly orchestrated suite (op. 32), with organ and (in the final section) female chorus, consists of seven tone-poems, each given an astrological interpretation: Mars, the bringer of war; Venus, the bringer of peace; Mercury, the winged messenger; Jupiter, the bringer of jollity; Saturn, the bringer of old age; Uranus, the magician; Neptune, the mystic. Written in 1915, it was first performed at a private concert at Queen's Hall, London, 1918.

Planimeter (Lat. *planum*, level ground; Gr. *metron*, measure). Instrument for measuring the areas of plane figures. Used practically only for measuring irregular figures, the first planimeter was invented in 1814 by Hermann, a Bavarian engineer. The best known modern planimeter is that known as Amsler's. Its essential features are two movable arms, A and B, on the extremity of one of which is a pointed support E, and on the other a pencil or tracing point, F. The latter arm has on it a graduated cylinder, D, which rolls round as the tracing pointer is moved along the perimeter of the area to be measured. A vernier, H, and a horizontal disk, G, worked in conjunction with D, enable the area of the figure to be measured or calculated.

Plankton (Gr. *planktos*, wandering). Name given in 1887 by the German scientist Hensen to the swarms of small or microscopic organisms in the sea, which drift more or less passively with the currents. Lakes and rivers may also contain plankton populations. The microscopic plant plankton includes diatoms and dinoflagellates, most of which, by virtue of possessing certain plant pigments, can synthesise carbohydrates under suitable conditions of illumination, perhaps down to 40 fathoms below the sea surface. This phytoplankton constitutes the basis of animal life in the sea, many members of the animal plankton or zooplankton directly depending on these minute plants for food. Herring, shad, and some sharks feed on the zooplankton, which they strain from the water by closely set bristles or gill rakers; while the whalebone whales feed mainly on euphausians (krill) in the zooplankton, filtered from the water by long plates of baleen suspended in the mouth. Zooplankton includes foraminifera, radiolaria, jellyfish, arrow worms, crustaceans (e.g. copepods), euphausians, and pteropod molluscs, all living permanently in the floating state. The eggs and young of many fish, crustaceans, molluscs, worms, etc., appear in the plankton seasonally. Many zooplankton organisms exhibit powers of diurnal vertical migration.

Planquette, ROBERT (1848–1903). French composer. Born in Paris, July 31, 1848, he studied at the conservatoire there. He composed operettas, including *Les Cloches de Corneville* and *Rip van Winkle*, which gained popularity in both France and Great Britain. Other operettas were *Nell Gwynn*, and *The Old Guard*. He died Jan. 28, 1903.



Planimeter. Diagram showing Amsler's planimeter. See text.

Plant. Organism capable of living upon, and of absorbing into its tissues, a whole range of inorganic substances, and of transforming these into organic compounds. Plants have no specific power of locomotion, neither have they special organs of digestion or of sensation. Plants are members of the vegetable kingdom, which

includes a very wide range of organisms ranging from minute simple-celled plants (without division of labour) to complex forms of plant life such as trees, shrubs, and herbs. The higher plants have distinct parts, e.g. root, stem, leaf, flower, fruit. Each of these organs is subject to considerable modification, and such modifications give some indication of evolutionary development in the higher plant groups. Plants are classified into families, genera, species, strains, and jordanons, using, as the basis of classification, the modifications of various organs exhibited by the several groups. In particular the leaves, flowers, and fruits in all their many forms and placements are used in such classification.

The root of a plant normally inhabits the surface layers of the soil. Its major functions are (1) to anchor the plant in the ground, and (2) to absorb from the substratum (the soil) water and other plant nutriment which are then translocated to the stem, leaf, flower, and fruit, there to be converted into protein and the other complex organic products of the plant. Certain major elements (as well as water) are known to be essential for plant life and health. Elements normally absorbed in solution from the soil through the roots include hydrogen and oxygen (as soil water), calcium, potassium, phosphorus, nitrogen, sodium, manganese, chlorine, and sulphur; also the whole range of so-called trace elements—cobalt, copper, magnesium, zinc, molybdenum, boron, iodine, and selenium. Deficiency of any of these elements in the soil leads to recognizable symptoms of ill health in the plant which can be remedied by the use of a suitable fertiliser. The absorbing organs are the root hairs which normally occur near the growing point of the root (whether main or secondary).

Importance of Leguminosae

Some plants absorb certain elements in solution through the leaves; thus nitrogen and potash starvation can in some cases be quickly corrected (as an emergency measure) by spraying leaves with solutions containing these elements. Members of the family Leguminosae (the clovers) and some other groups absorb nitrogen direct from the soil air. Members of the Leguminosae do this by means of the nodules on their roots. These nodules contain aggregates of bacteria (*Bacterium radicicola*) and exhibit one of the most interesting instances of symbiotic achievement in the whole

vegetable kingdom. Many of the farming systems of the world are based on this one fact of the symbiosis of legume and bacterium, for upon it depends the standard of fertility of the soil.

Many other groups of plants take nitrogen direct from the soil air and through their roots. Some groups do this by the development of mycorrhiza, representing a symbiosis of the higher plant with a fungus (a plant without green matter or chlorophyll). Most of the fungi get their nitrogen by breaking down plant and animal remains. Some forms of bacteria (e.g. *Azotobacter*) living a free life in the soil absorb nitrogen direct from the soil air and thus make it directly available to the higher plants growing in the same soil. Knowledge of forms of plant life in and on the soil is considerable, but far from complete.

Parts of the Plant

The stem of the higher plant is normally above ground, though many plants have underground stems (e.g. the potato). The stem bears leaves, flowers, and fruit. The young, actively growing stem is soft and succulent, but may (as in trees) later harden and become woody. In forest trees the stem (or trunk) may be very massive, enduring to great age. The stem translocates food material and water between the roots and the leaves, flowers, and fruit. The higher plant has two main growing regions, namely (1) the underground root tips, and (2) the aerial shoot tips. Perennial trees have another type of growth, exhibited, e.g., in the annual rings in the British oak.

The leaves of most plants are normally thin and flat, forming an expanse of soft tissue which contains chlorophyll, a material essential for the nutrition of the plant, by which it absorbs the oxygen used in the normal process of respiration. The leaf carries stomata (or breathing pores) through which the plant takes in much of the air from which it extracts oxygen. Carbon dioxide (CO_2) is also taken in through the stomata, and the plant derives the major part of its carbon from this source by photosynthesis (q.v.). In this respect plants stand out in sharp contrast to most members of the animal kingdom. Green plants are able to extract carbon from the carbon dioxide of the air, whereas animals depend upon plant remains for their carbon needs. The leaf of the green plant is therefore (under the

influence of light) a complex system producing organic carbonaceous compounds from the cruder inorganic elements. Without this process of plant life, animal, including human, life would be impossible.

Leaves show a wide variety of modification in relation both to division of labour in the plant itself, and also to environmental conditions. Some leaves are green, broad, and flat; others on the same plant may be modified to form parts of the flower and the fruit. The floral leaves (e.g. sepals and petals) may be highly coloured to attract insects. In other plants the leaf may be modified to trap and to digest insects, e.g. in the *Droseraceae* (q.v.).

PLANT HYBRIDISATION. Some plants are self-fertile, others are self-sterile. In the latter group, of which many grasses (members of the family Gramineae) are good examples, the ovary of one plant must, before it can set seed, be fertilised by pollen from another plant, usually of the same species. Oats (*Avena* spp.), wheat (*Triticum* spp.), and barley (*Hordeum* spp.) are three members of the grass family possessing a high degree of self-fertility. Ryegrass (*Lolium* spp.), cocksfoot (*Dactylis* spp.), timothy (*Phleum* spp.), and most of the perennial legumes (*Trifolium* spp., *Medicago* spp.) are normally only cross-fertile. The cross-fertile grasses are usually wind-pollinated, pollen being carried on wind and air streams. Most cross-fertile legumes are insect-pollinated—chiefly by bees in the U.K.

Plant breeders of the 19th century and earlier were for the most part selectors; but, following appreciation of the work of Mendel, 20th century plant breeders and geneticists produced new varieties of cereals, grasses, and legumes by intentional crosses.

Methods of Plant Breeding

Plant breeding, including intentional crossing and selection, in a plant normally self-fertile, like wheat or oats, is fairly simple and was already used by plant breeders of the 19th century. Plant breeding in a grass or clover normally cross-fertile (and self-sterile) is less simple. One highly successful method used by British clover breeders is as follows: a number of similar genotypical selections are made, and these are closely inbred (mating closely related plants). After several generations, it is usually found that close inbreeding has led to loss of vigour. Vigour is recovered by bulking a number of inbred families, all of

not dissimilar genetic composition. In this way, a new strain is formed. Such a strain shows some variables among its constituent plants, but so long as the type is stabilised, such variation is of no disadvantage to the farmer.

Cereal breeders have, since the middle of the 19th century, bred varieties of cereals capable of producing much increased yields of grain, and varieties resistant to diseases of all sorts. Varieties of wheat have been developed which will grow in colder climates (as in Canada) or in dry regions (as in Australia and the U.S.A.). Grass and clover breeders, in particular of the U.K. and New Zealand, have by careful crossing, selection, and critical agronomic testing, produced new strains of leafy, persistent, and productive herbage plants. The production of these new strains of grasses and clovers have made ley-farming (*q.v.*) possible. See also Fertiliser; Fungus; Mendelism; Virus, etc.

William Davies, D.Sc.

Plantagenet. Name commonly given to the family to which the English kings from Henry II to Richard II belonged. More correctly they are styled Angevins, from Anjou, of which Geoffrey, father of Henry II, was count. Plantagenet was a nickname bestowed on Geoffrey because he wore a sprig of broom plant (Lat. *planta genista*) in his cap, and was not used as a surname for his descendants until later, being adopted first, perhaps, by Richard duke of York, father of Edward IV.

After the death of Richard II, in 1399, the throne passed to the house of Lancaster, and then to that of York, both of these being branches of the Plantagenet family. In the male line the family became extinct when Edward, earl of Warwick, a nephew of Edward IV, was put to death in 1499. The name Plantagenet was borne afterwards as a surname by one or two illegitimate descendants of the kings. Through females all the sovereigns of Great Britain since Henry VIII are descended from the Plantagenets. See Angevins; Anjou; Henry II.

Plantaginaceae. Family of annual and perennial herbs, natives of all temperate regions. As a rule the leaves all spring directly from the rootstock. The flowers are small, green, and inconspicuous, in spikes, and the fruits are small capsules.

Plantain (*Plantago*). Genus of herbs of the above family Plantaginaceae, natives of all temper-



Plantain. Leaves and fruit spikes of *Plantago major*

ate regions. They have inconspicuous green flowers, fertilised by the wind as pollen carrier. The greater plantain (*P. major*), known also as waybread, produces long spikes of fruit, used for feeding cage-birds. In almost every place where Europeans have been this plant is found as an introduced weed, and the coloured races know it as the white man's foot. *P. media*, lamb's tongue, or hoary plantain, is a nuisance on lawns, where its rosette of broad leaves lies so close to the ground that it kills out the grass. See Banana.

Plantain Eaters (*Musophagidae*). Family of birds peculiar to the continental portion of the Ethiopian region. They consist of six genera and about 25 species. They vary in size, ranging from 15 to 30 ins. in length. They have large eyes, long necks, and the red, yellow, or black bill is usually stout and broad. The black feet are strongly clawed, and the outer toe is reversible. Most species have erectile crests on the head, and the plumage is metallic blue and green, or grey-brown, varied with crimson. The red feathers yield a pigment (turacin). Usually found in pairs or small flocks in wooded country near water, their food consists of bananas, tamarinds, papaw, and other fruits, varied by insects, worms, molluscs, and small birds. Their notes are a scream or a catlike mew. They run swiftly, but are caught and eaten by the natives. *Turaco corythaix*, of S. Africa, is known locally as the lory.

Plantain Lily (*Funkia*). Genus of perennial herbs of the family Liliaceae. They are natives of Japan. The perennial organs are a bunch of tubers. The leaves, which spring direct from the crown, are large, oval or heart shaped. The flowering stems rise above the leaves and bear a number of tubular flowers of white or lilac tint, each with a narrow leaf-

like bract beneath its stalk. Several species are cultivated as bedding or border plants.

Plantation. Term applied to a newly planted copse or wood, established either by planting nursery-raised seedling trees, or by the sowing of seed. Plantations in the U.K. are usually made up with mixed trees, the quicker growing conifers being employed to shelter the others from wind and weather. In the course of years, when the conifers, etc., have been cleared away and used for fuel, or commercial purposes, the slower growing trees become technically a wood. In making a plantation of conifers, it is usual to sow gorse or furze seed to act as protection against weather.

The word plantation is also applied to estates devoted to the cultivation of crops which need constant renewal, as rubber, sugar, rice, tobacco, and cotton. Such were the plantations in America and the W. Indies, to which convicts and slaves were sent. The settlement of English and Scottish colonists in Ulster in the time of Elizabeth and James I is known as the plantation of Ulster.

Plant Bug. Popular name for creatures of the order Hemiptera (*q.v.*) and in particular of the sub-order Heteroptera (*q.v.*).

Plantin, CHRISTOPHE (1514-89). French printer. Born at St. Avertin, near Tours, he settled at Antwerp in 1549 as a bookbinder, took up printing in 1555, and founded a business which won for him a European reputation. The most notable example of his work is the Polyglot Bible, of 1569-72. In 1570 Philip II granted Plantin a special privilege as printer of liturgical books, in addition to which he issued fine editions of the classics. He opened branch offices in Leyden and Paris. After his death the business was carried on by his son-in-law, Jean Moretus, the latter's son, Balthasar, and other members of the family. Plantin's home and printing office in Antwerp, from which his descendants issued books for 300 years, was bought by the city of Antwerp, 1876, and became known as the Plantin-Moretus museum. Consult C. P. Imprimeur Anverso, M. Rooses, 2nd ed. 1896.

Planting. Art of placing trees, shrubs, and plants in a proper manner in suitable soil, to ensure their healthy establishment and welfare. In planting fairly large trees the question of aspect needs consideration. Twisting trees and even shrubs round indiscriminately



1. Wheat . ripe ear, flower spike, and foliage 2. Oats 3. Barley . flower spike, ripe ear, and leaves 4. Maize plant and ripe cob 5. Rice . plant and ripe head 6. Tea 7. Hops 8. Vanilla . flower and pod 9. Cotton flower branch and bursting pod 10. Flax 11. Sugar Cane 12. Coffee 13. Cacao 14. Para india rubber plant 15. Tobacco 16. Hemp 17. Indigo

PLANTS CULTIVATED FOR THEIR GREAT COMMERCIAL VALUE



1. Cardiff police officer (summer uniform). 2. Rhodesia
3. New Zealand. 4. Fiji. 5. West Indies. 6. Australia
7. Kent policewoman sergeant. 8. Armed Norfolk
policeman searching a thicket for an escaped prisoner
9. "Courtesy" motor-cycle patrol. 10. Mounted

policeman, London 11. Maintaining radio-telephone
contact between Scotland Yard, London, patrol cars, and
police stations. 12. Thames police patrol launch. 13.
Police van (familiarily known as "Black Maria"),
Scotland Yard 14. Scotland Yard mobile unit

POLICE: OFFICERS AND ACTIVITIES IN THE U.K AND COMMONWEALTH. See text pages 6591-93

to face new aspects retards their growth. Hence before being moved from its original home the side of a tree which has been facing, say, S., should be marked in order that it may be placed in the same direction in its new home. Roots should be disentangled, broken pieces and tap-roots pruned off, and the fibres spread out horizontally.

The quick method of digging a narrow, deep hole, and cramming the roots of a plant or tree into it vertically, is wrong. The soil should be pressed very firmly about the roots of newly planted trees and shrubs, especially when the operation is carried out in the autumn. Spring-planted subjects may be allowed a little more latitude in this respect, as there is less danger of frost to be feared. When planting the young greenhouse-raised summer bedding plants, the soil should be left fairly free and open for the purpose of aeration, but care should be taken to set the roots fairly deep in the ground. The soaking of water which follows the planting of summer bedding plants usually washes the soil down sufficiently close to secure the welfare of the roots of the plants in their new homes. See Forestry; Gardening; Sowing.

Plasencia. City of Spain, in the prov. of Cáceres. It stands on the river Jerte, an affluent of the Alagón, 156 m. by rly. W. of Madrid. Its unfinished cathedral was founded in 1498. Plasencia was founded by Alphonso VIII of Castile in 1189 and created a bishopric next year. It has a palace dating from 1550, a Roman aqueduct, and remains of 12th century walls. The monastery of San Yuste, where Charles V retired after his abdication, lies 24 m. to the E. Pop. 12,000.

Plasma. That part of blood which coagulates is mentioned in the article Blood.

Plasmodium. Biological term for a multinucleate protoplast which is not invested in a wall. It is in this form that the slime fungi (Myxomycetes) pass most of their active life, moving over the surface of plant debris by protruding pseudopodia, by means of which they ingest solid particles for food. Plasmodia of Myxomycetes vary in size from microscopic to some inches in diam. and are more or less completely converted into sporangia containing numerous spores when reproduction occurs.

Plassey. Former village of W. Bengal, India. It was on the Bhagirathi, about 95 m. N. of Calcutta. Here Clive defeated the

nawab of Bengal, June 23, 1757. In 1756 the British at Calcutta were threatened by Suraj-ud-Dowlah, nawab of Bengal, Orissa, and Bihar, who captured the town, and followed this with the notorious atrocity of the Black Hole (*q.v.*). Operations against him were carried on by Clive with varying success through the winter and the spring of 1757. Clive came to an arrangement with Mir Jaffir, the nawab's commander-in-chief, to set him on the throne of Bengal, and on June 13 advanced up the Hooghli from Chandernagore.

His force consisted of about 1,000 Europeans, 2,100 sepoys, and 10 guns, and, informed by Mir Jaffir of the nawab's plans, he advanced to Plassey. Crossing the river on June 22, he faced the advancing enemy on the next day. Suraj commanded some 35,000 foot soldiers, with 18,000 cavalry, and about 50 guns, including some French batteries. After a violent bombardment which strained the nawab's ammunition resources, Clive attacked, and overpowering a stubborn French redoubt, swept the field. Mir Jaffir was installed as nawab, but as he was merely a nominal ruler, Plassey had made the British masters of Bengal at insignificant cost. The river had eaten away the battlefield by 1801. See Clive; India: History.

Plaster. Pasty composition, used for coating walls, ceilings, etc. From remote times it has been a common practice to give a more or less smooth finish to wall surfaces by covering them with a tractable material—plaster, a term that may be held to include the clay-daubing of primitive huts. With respect to materials, choice is limited to earths containing cement, crude or manufactured, and used separately or in combination with other materials, such as powdered stone or marble, asbestos, tufa, sand, hair, fibre; while the addition of agglutinates like molasses or glue facilitates moulding and modelling to decorative shapes.

Ordinary plaster, as used on walls and ceilings, is made by mixing in water slaked lime with twice its bulk of clean, sharp sand—river sand for exterior and pit sand for interior work. Plaster of Paris is used by the plasterer mainly for patching and repairing, but is also mixed with ordinary plaster to quicken setting and to give greater hardness. The cements known as Keene's, Martin's, and Parian all have gypsum as their basis, and in the order given are compounded respectively with alum, carbonate

of potash, and borax. Roman cement is made from septaria found in the London clay.

Rendering is the external application of a Portland cement and sand mix to walls, usually one part cement to four parts sand for the first coat and a slightly stronger mix for finishing. An admixture of hydrated lime lessens the tendency to craze on setting. White or coloured cements are often used in finishing coats, and waterproofed cement for damp-proofing.

Rough-cast is a finish of granite, marble, or stone chippings thrown on the second coat before it has set. Pebble dash is similar.

Stucco, a term loosely used to denote exterior plastering and rendering, was the name given to mortar coverings finished with oil paint, widely popular in the Regency period, especially with John Nash. This work is now superseded by Portland cement renderings.

Interior Work

Fir laths are nailed to ceiling joists and partition studs (upright timbers), with narrow gaps between laths, to provide a key to which the plaster holds. In fire-resisting construction and exterior work, expanded metal lathing is similarly used.

Plaster blocks make thin partitions. Plasterboard, of gypsum plaster cast and compressed between sheets of fibrous paper, lines ceilings, walls, and partitions, and is nailed to joists, studs, or battens.

In the plain plastering of interiors the familiar creamy mixture of lime, sand, hair or fibre, and water, as applied to lathed walls and ceilings, is technically described as render, float, and set, or three-coat work. The rendering, or first coat, consists of coarse stuff—one part fat lime to two or three parts sand, with a pound of ox-hair to 2 cu. ft. of plaster. This coat is left with a rough surface, on which intersecting furrows are scratched with a lath, to form a key for the next coat (floating), which contains less sand and less hair than the rendering coat, and is floated to an even surface by means of straight edges or of a Derby float—a large flat board with two handles at its back. To get a true surface, a general level is indicated by placing fillets of plaster (screeds) at intervals over the surface, the plasterer bringing the intervening spaces to the level fixed by the screeds. A smaller float is then worked over the surface, which finally is scratched with a coarse broom of bristle or a

pointed lath. The setting coat may consist of fine lime plaster with plaster of Paris added.

Decorative plastering—the panelling, covering, gilding, colouring, and general enrichment of walls and ceilings—had become elaborate in Tudor and Jacobean times, and in the late 18th century Adam, Chambers, and Nash designed rich effects in plaster. Ornamental plastering may involve the use of the casting-box and the chisel; but the legitimacy of cutting plaster is disputed, on the ground that sharpness of edge and outline is alien to the essentially “fat and sleepy” character of plaster. Wood or zinc moulds are used in running cornices, and other straightforward ornaments; but rosettes, festoons, cables, and other irregular patterns must be cast from modelled designs, from which moulds are made in gelatine, plaster, or wax.

The form called sgraffito decoration is obtained by placing a transfer design on the second of two finishing coats, the first coat dark, the other light, and scraping away portions of the top coat to form a pattern in slight relief. Pargeting or parge work shows a raised pattern. Fibrous plaster, pre-cast in ornamental character, is used in cinemas, etc.

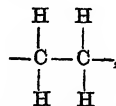
Plaster Cast. The commonest method of reproducing or giving permanent form to a clay model is by taking a plaster cast from a mould of plaster, gelatine, or wax.

If the model is “in the round,” the model has to be made in several pieces, the joining of these requiring some skill. The dead effect of a plaster cast can be remedied by treating it with French polish or wax. A little colour can be judiciously added. Plaster casts may also be given the effect of bronze by successive applications of bronze powder mixed with French polish, of green or bronze pigment, and of wax, the whole being highly polished.

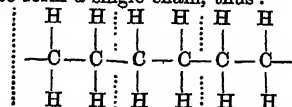
Plaster of Paris. Partly dehydrated calcium sulphate formed by heating to 120° to 130° C. the mineral gypsum, which then loses three-fourths of its water of crystallisation. On the addition of water equivalent to that removed by calcining, plaster of Paris recrystallises, and sets as gypsum. It is sometimes added to ordinary lime plaster to quicken the setting, or used by itself for forming delicate mouldings and ornaments, or for repairing plaster walls or ceilings. It sets very quickly. Heated to 194° and finely ground, gypsum forms a hard flooring material and is a component of many proprietary flooring compositions. Plaster of Paris bandages, made by saturating bandages with the powder, are used in surgical practice. The bandage is dipped in tepid water at the time of application. The name plaster of Paris is derived from the extensive deposits found near Paris.

materials into large units, chiefly in the form of chains of relatively simple molecules.

For instance, the gas ethylene (C_2H_4) is unsaturated, i.e. it is a substance in which the full combining power of the element carbon has not been utilised. It can be represented graphically thus:



with two of the available carbon linkages inviting continuation. This can be accomplished in a variety of ways, one of which is the union of several ethylene units to form a single chain, thus:



If this process is carried further, a stage is eventually reached when, with many such chains going to form a bundle, the substance actually passes from a gas to a solid, in this case a brittle solid called paraffin wax, of some 20 carbon atoms average chain length. If this reaction is taken much further under the action of several thousand pounds pressure, and in the presence of a chemical driving agent, or catalyst, a very tough solid called polythene emerges, when a stage at approx. 200 carbon atoms chain length is reached. Man had discovered, that is to say, that by a process of repetition of certain characteristic chemical units, as for example ethylene, he could imitate nature's process of molecular chain building, and build up molecular structures to give products to meet many and varied needs. Such, in its broadest and simplest terms, is the scope and technology of plastics.

In some instances the chemist makes up his long chains by the repetition of simple units or their nearly related compounds, i.e. by processes usually called polymerisation. He starts with the simple unit, the monomer, frequently a gas or a liquid, and he finishes up with the polymer which, according to the length or constitution of the chain, may vary from a soft to a rigid material. In other instances the chemist takes simple yet dissimilar substances, such as phenol and formaldehyde, and unites these by processes called condensation, and then further builds these up into long chains by polymerisation.

PLASTICS: A 20TH CENTURY PRODUCT

V. E. Yarsley, D.Sc., Consulting Chemist

See also Cellulosic Plastics; Glass-like Plastics; Glyptal Resins; Laminated Plastics; Melamine Plastics; Methy-Methacrylate Plastics; Phenolic Plastics; Protein Plastics; Vinyl Plastics; etc.; Ethyl Cellulose; Nitrocellulose; Nylon; Styrene; etc.; Buna; Rubber, Artificial, etc.

The term plastics (Gr. *plastikos*, moulded) in its accepted industrial sense embodies those organic materials which at some stage of their production are capable of flow, and which under the combined action of heat and pressure can be caused to flow and take up any desired shape. Most plastics are carbon compounds, complex substances built up by chemical processes, either from naturally occurring raw materials, or from materials which are in themselves breakdown products of those found in nature. They thus cover a wide range of chemicals which differ in their properties from rigid to rubber-like bodies and, within the limitation imposed by the presence of the element carbon, are materials

capable of almost infinite variation in physical properties.

Although many of the fundamental raw materials used in the production of plastics, e.g. benzene, phenol, urea, styrene, acetylene, are as old as organic chemistry itself, the conception of plastics dates from the pioneer work of Baekeland early in the 20th century. Traditional organic chemistry found use only for the clearly defined substances available as liquids or as crystals. Baekeland showed that many products which lay between the two, and had long resulted as sticky masses from chemical reactions, could eventually be turned to good purpose. From his work sprang an entirely new approach to chemistry, the building up of

Plastic materials are divided into two chief groups, thermosoftening and thermohardening. In some, *e.g.* the ethylene polymer cited, the chains are capable of relative motion with respect to one another with increasing temperature, up to the point of decomposition, where the chain is ruptured and reverts to gaseous products of combustion. Such a material is stated to be thermosoftening. The chains formed by the condensation of phenol and formaldehyde, however, when subjected to adequate heat are cross-linked, that is they become rigid with respect to one another, by lateral chemical linkages. Once this cross-linking, or curing, is effected, then further heat cannot cause the chains to move with respect to one another and, short of decomposing, such materials are unaffected by further heat and pressure. These materials, which are thermohardening, include Baekeland's pioneer materials and the urea-formaldehyde family.

Characteristics of Plastics

Plastics containing carbon and hydrogen only, such as the ethylene polymers, are water repellent, corrosion resistant, and wax-like, and have remarkable electrical properties. Those based on nature's own long chain polymer cotton, such as cellulose acetate, which contain hydroxyl radicals in addition to combined acetic acid, are less resistant to water but have other compensating properties. Nylon, the long chain polyamide, follows in simpler terms nature's complex polymer silk. The introduction of halogens, such as chlorine or fluorine, into the molecules has a marked effect on the general resistance of plastics. Those polymers based on tetrafluoro-ethylene (that is, ethylene in which all the hydrogen has been replaced by fluorine) are stated to withstand boiling aqua regia or fused caustic soda. They are incidentally among the most dense of synthetic polymers, having a specific gravity of 2.1 to 2.2. Significant also for the properties of a plastic is the substitution of other elements for carbon in the fundamental structure. For instance, materials (called silicones), in which silicon, closely related to carbon in the periodic classification of the elements, is the centre of the structure, are characterised by their resistance to heat, far exceeding that possible with the heat-vulnerable carbon compounds.

The claim that plastics have "metal strength at wood weight"

can be substantiated; but the popular idea that they are cheap is far from the truth. On the contrary plastics are costly. Many of them possess, however, unique properties which more than offset their cost. They also lend themselves to mass production of finished items so that the comparatively low labour cost of their manipulation compensates for the relatively high cost of the material.

RAW MATERIALS FOR PLASTICS.

The materials from which plastics are prepared are widely distributed over the earth's surface, but the chemist finds only a few long-chain products to hand in nature. These include cellulose, available as wood pulp and cotton linters, and the protein-containing materials such as casein, soya, and coffee beans. These need chemical treatment to bring them to the required state of purity before they can be further processed to produce such plastic substances as celluloid, cellulose acetate, and casein.

Most other materials used by the chemist to start his chain building are relatively simple, and many of them he obtains from coal and oil—both of which, still used, in general most uneconomically, chiefly as sources of power and heat, will probably eventually be conserved for a much more important rôle as nature's chemical storehouse. The gasification of coal and the cracking of oil yield a large number of fundamental raw materials such as ethylene, benzene, phenol, cresol. Coal and lime yield carbide, which in turn yields acetylene which, besides being a most important raw material for the engineering industry, is the starting point for many plastics. Another key material for plastics is formaldehyde, used in industry as a 40 p.c. aqueous solution, formalin, which is produced synthetically from carbon monoxide and hydrogen via methane. Incidentally, sewage, disposal of which was once simply a matter of public health, is potentially the most economic source of methane, valuable both as a fuel and a chemical raw material.

THERMOFTENING PLASTICS.

The pioneer plastics of the cellulose family are based on cotton linters or purified wood pulp. Cotton linters treated with suitable mixtures of nitric acid, sulphuric acid, and water yields cellulose nitrate, which is used in plastics at a nitrogen content of 10.8–11.9 p.c. (At a nitrogen content of more than 13 p.c. it is the explosive gun cotton.) Cellulose nitrate with

camphor and alcohol is the plastic celluloid. Cotton linters treated with mixtures of acetic anhydride, glacial acetic acid, and sulphuric acid yields cellulose acetate. This when mixed with plasticisers, such as dimethyl phthalate and solvent acetone, yields cellulose acetate plastic, available in powder form for injection or extrusion moulding, and as free-flowing solutions for making films and lacquer coatings.

Styrene and the Vinyls

Some of the more important synthetic materials are based on the aromatic hydrocarbon benzene. This is converted via ethyl benzene into styrene, a limpid liquid which polymerises to the glass-like polystyrene, produced in vast quantities in the U.S.A. and Canada during the Second Great War in the manufacture of synthetic (Buna) rubber. Closely allied to styrene, but aliphatic rather than aromatic in general character, are the vinyls, which are essentially derivatives of vinylalcohol. Acetylene and acetic or hydrochloric acids produces vinyl acetate and vinyl chloride respectively. These build up to give "straight" or co-polymers, which can be almost illimitably varied, and give products which may be rigid or may be numbered among the synthetic rubbers or elastomers.

Still within the vinyl family, and based on acetone, is methyl methacrylate, from which a transparent plastic is produced. Here again the changes can be rung through the various esters to pass from the rigid methyl polymers to the rubber-like octyl and decyl derivatives. Benzene can be converted into adipic acid and this into hexamethylene diamine, and these two together build up the long-chain nylons, known chemically as the polyamides.

THERMOHARDENING PLASTICS.

Phenol or one of its related products, such as cresol, together with formaldehyde yields a resinous mass (P.F. resin), which with 50 p.c. of wood "flour" admixed, and in powder form, forms the compression moulding powder in the process invented by Baekeland. Urea, or related melamine, and formaldehyde yield thermohardening resins, which with light coloured α -cellulose fillers, can be used to produce another type of moulding powder.

Though of small consequence in the plastic industries, yet constituting more than half of the synthetic resins produced, are the products obtained by condensing glycerine with phthalic acid. The

chief use of these alkyds or glyptals is in surface coatings.

PROCESSING. (1) *Compression Moulding.* In this the moulding powder or preformed pellets are introduced into the mould, and then formed by heat and pressure. This is applied in the main to the thermohardening plastics. The moulding cycle is sufficiently long not only to form the unit, but also to effect the necessary cross-linkage, or cure, of the plastic.

(2) *Injection Moulding.* In this the plastic is first liquefied by the application of controlled heat, and in this condition is forced into the cooled mould, from which it is rapidly ejected. Injection is applied to thermosoftening materials, so that no cure of the plastic has to be effected.

(3) *Extrusion Moulding.* The processes for forming units, such as tubes, rods, or varied sections, by extruding the plastic through a suitable die orifice are very similar to injection moulding. Units of regular cross-section are produced continuously and cut up into lengths as desired. Extrusion moulding can be applied to both thermohardening and thermosoftening plastics, but is usually confined to the latter. It is sometimes used in the production of relatively thin sheets, particularly of celluloid or cellulose acetate, though these are more usually prepared by slicing the sheets at the desired thickness from consolidated blocks of the plastic. The sheets thus produced show the "knife" lines, and a final polish is imparted to them by hot pressing between highly polished nickel plates. By hot embossing, patterns are produced on the surface of such sheets, or they may be reinforced by hot pressing with wire mesh or decorative fabrics.

(4) *Laminated Materials.* Solutions of thermosoftening or thermohardening plastics, chiefly the latter, are used to impregnate sheets of paper or fabric, including glass fabric. These are then bonded together to give laminates of great variety and strength. Sheets up to a tensile strength of 50,000 lb./sq. in., with a density of little more than half that of duralumin, have been produced in this way. (See Laminated Materials.) The advent of the catalyst cured polyesters has made lamination possible at pressures little more than is necessary to maintain contact between the constituent plastic-impregnated fabric layers.

An important side of the processing of plastics is the mani-

pulation of sheet materials. The plastic sheet is heated above its softening point, and is then, with the aid of suitable moulds, pressed or blown into the desired shape. For this thermosoftening materials are chiefly used, but certain post-forming laminates (called P.F. sheets) can be heat-formed into shapes which have limited "draw."

Moulding and Casting

Moulded plastics usually require expensive moulds to withstand the high pressures applied, but suitable plastics in syrup form can be shaped in inexpensive metal (lead) or flexible (P.V.C.) moulds. These casting processes can be applied to both thermohardening and thermosoftening plastics, suitable catalysts being used to effect the necessary build up of the molecules from the short chain length syrups to the long chain rigid cast plastic units. The inexpensive moulds used in the casting process make it possible economically to produce a few units, whereas with the expensive compression or injection moulds a run of 50,000 units is the economic minimum.

Before the Second Great War Germany, the U.K., and the U.S.A. were the principal producers of plastics, production per head of population in 1937 being 1.5 lb. in Germany, 1.45 lb. in the U.S.A., and 1.1 lb. in Great Britain. After the war, owing to intensive wartime development, plastics production in the U.S.A. had greatly risen both absolutely and relatively. But the plastics industries continued to be small compared with such old established industries as iron and steel, total world production of all plastics (excluding the synthetic rubbers) being about 1,000,000 tons per year. The production of plastics in the U.K. in 1946 was between 80,000 and 85,000 tons with a value of £18 to £20 million, and employed 80,000. (1947 coal production was 200,000,000 tons valued at £400 million and employing 700,000 workers; agriculture at £500 million with one million workers.)

The first official British statistics relating to the production of plastics, were in the Annual Abstract of Statistics, No. 84, 1935-1946 (H.M.S.O., 1948), and gave the following figures for 1946: cellulose acetate 5,737 tons, celluloid 2,100 tons, phenolic (and cresylic) moulding powders 25,221 tons, urea moulding powders 6,471 tons, polyvinyl chloride (all types) 15,548 tons, acrylic resin 3,949 tons. Total production in 1947 in the U.S.A. (according to Modern Plastics for

April, 1948) was 849,022,972 lb., with production for Jan., 1948, 81,107,358 lb.

Bibliography. Plastics, V. E. Yarsley and E. G. Couzens, 1941; Handbook of Plastics, H. R. Simonds, C. Ellis, and M. H. Bigelow, 1943; The New Plastics, H. R. Simonds and M. H. Bigelow, 1945; Plastics Applied, V. E. Yarsley, 1945; British Catalogue of Plastics, 1947; Chemistry of Commercial Plastics, R. L. Wakeman, 1947; Practical Plastics, ed. F. Smith, 1947.

Plastic Surgery. Sub-division of surgery. It aims at restoring form and function to the human face and limbs where these have been injured. Bone grafting and transplanting of skin and flesh to replace tissues lost by burning or other disaster, are in its special province. See Surgery.

Plastid. Botanical term applied to definitely shaped masses of protoplasm, sometimes containing pigments, found embedded in the cytoplasm of many plant cells. The chloroplastids present in green leaves, prothalli of ferns, mosses, liverworts, and some green algae are biconvex. In other green algae their shape is more elaborate, star shaped, or ribbon-like, or a cylindrical net. All contain chlorophyll and have for their chief function the process of photosynthesis (*q.v.*). In many, sugar may be converted into starch as a temporary means of reducing the sap sugar concentration. Photosynthesis is also carried on by the phaeoplastids of the brown algae and comparable bodies in many other autotrophic but not obviously green organisms. Chromoplastids, a term sometimes used to include all coloured plastids containing a preponderance of xanthophyll and/or carotin occur in some flowers and fruits. Their angular or thread-like shape is imparted to them by the tendency toward crystallising inherent in their chief pigments. Other than that of imparting colour they have no known function.

Leucoplastids lack pigments, occur in parts of plants which are not illuminated, and generally serve for the deposit of starch for prolonged storage. A like function is carried out by the pyrenoids embedded in the chloroplastids of some algae, and elaioplastids, said to occur in some seeds, serve for the accumulation of fat. To what extent the various kinds of plastid are homologous is in doubt, but in higher plants plastids are known to develop from minute rudiments called proplastids and

in some measure to be intermutable. Leucoplastids on exposure to light become green, chloroplastids deprived of it lose their colour and in ripening fruits become chromoplastids. See Pigment (in plants).

Plastiras, NICOLAS (b. 1884). Greek soldier and statesman. Born 1884 in a village in Thessaly in a poor home, he made a successful career in the army, was promoted, during the Balkan wars, to col. and gen. and, after the unsuccessful war against Turkey, 1920-22, during which he opposed its supreme command, staged with Gen. Gonatas a revolution in Athens, Sept. 28, 1922, which ended with Constantine's abdication and exile, and the execution of five of his cabinet ministers, a step for which Plastiras was blamed. He continued as dictator and, Dec. 1923, forced Constantine's son George to abdicate. Subsequently Plastiras went abroad for health reasons, returned, was exiled by Pangalos in 1925, returned again in 1926, confining himself to military duties, until in 1933 he assumed dictatorship for one day. This coup failing, he escaped abroad, and was sentenced to death in his absence. A lifelong republican, he lived in the S. of France until recalled to Greece by Papandreou, Dec., 1944. He was prime minister Jan.-April, 1945, and again from April, 1950.

Plataea. An ancient city of Greece, in Boeotia, on the N. slope of Mt. Cithaeron. Leaving the Theban league, Plataea became an ally of Athens, and sent 1,000 men to the battle of Marathon. In the second Persian War, Xerxes destroyed the city at the instigation of Thebes, 480 B.C. The Persian army under Mardonius, with a Theban contingent, fought the allied Greeks under Pausanias of Sparta before Plataea in 479.

Pausanias was forced to withdraw in some confusion, but rallied his army, and the heavy armed Greeks drove the Persians back to their camp, which was stormed with the aid of the Athenians, the Persian army being almost annihilated. This victory, following upon that of Salamis, decided the struggle.

The independence of Plataea was then guaranteed by the Greek states, but in the Peloponnesian War (*q.v.*) it was besieged, 429-427, and destroyed by Thebes and Sparta. In 372 the Thebans again destroyed it. See Greece.

Plate (late Lat. *platta*, a thin sheet of metal; cf. Gr. *platys*.

flat). Word used in various derivative senses, all suggesting something thin and flat. In household use, plates or platters were commonly made of wood or pewter until earthenware came into general use. In engineering, iron or steel plates are used in the construction of boilers and the hulls of ships.

In farriery the shoe put on a racehorse is called a plate, and the same word is also used for any prize given in horse-racing without any stakes provided by the owners of the horses engaged.



River Plate Battle. The scuttling of the German pocket battleship Admiral Graf Spee four days after taking refuge in the port of Montevideo, whither she had been driven by the naval force under Commodore Harwood

In photography, a plate is a glass support, coated with a sensitive emulsion. In metallurgy a plate is a sheet of metal above $\frac{1}{8}$ of an inch thick; such plates are made by rolling out an ingot or a billet in a suitable hot working temp. in lengths up to 40 ft., widths up to 12 ft., ordinary thicknesses up to 3 ins., armour-plates to 18 ins. In engraving, a plate is the metallic surface on which the engraving is done, and, by transference, the impression from the engraved plate. A general term for gold or silver articles, the word is also used in mineralogy and anatomy. In heraldry it means a rounded argent. See Electro Plating; Sheffield Plate.

Plate. Name sometimes given to the S. American estuary better known as the Río de la Plata, or River Plate. See La Plata.

Plate, BATTLE OF THE RIVER. Sea battle of the Second Great War, fought Dec. 13, 1939. Before the outbreak of war the Germans had sent the Admiral Graf Spee (14,000 tons; six 11-in. guns, eight 5.9-in. guns) out into the Atlantic ready to attack commerce. With two sister ships, she had been specially designed for this purpose, combining with an armament heavier than that of any

cruiser armour and a speed greater than that of any existing British battleship.

Indications of the raider's movements had been gathered from distress signals received by wireless from some of her victims. Commodore Harwood, in command of the S. America div. of the R.N., judging with a seaman's vision the Graf Spee's next move, concentrated 150 m. off the Plate estuary, in a focal trade area, three cruisers, the Ajax (his own ship) and the Achilles (manned by the R.N.Z.N.),

twins of about 7,000 tons each armed with eight 6-in. guns, and the Exeter, 8,390 tons, mounting six 8-in. guns. The Admiral Graf Spee was in theory capable of sinking all three of her opponents. Yet throughout the action her chief endeavour was to disengage herself, a course in which she was frustrated by the superior speed and determined pugnacity of the British ships.

Fire was opened at 6.18 a.m. on Dec. 13. At the outset the German captain made the mistake of dividing his fire between the Exeter on the one hand and the Ajax and the Achilles on the other, but on finding the 8-in. guns of the Exeter troublesome, he concentrated attention on that ship. In the first 20 mins. four out of her six 8-in. guns were disabled, but she continued to fire from her after-turret.

In the meantime the other two cruisers had been making excellent shooting with their more rapid firing 6-in. guns, and the action developed into a chase, the German ship making for the Plate estuary and putting out a smoke screen. After an hour, however, the Admiral Graf Spee appeared to find the situation intolerable, and steered directly for the Exeter as though she intended to finish off

the damaged cruiser. So effective was the fire of the Exeter's consorts, however, that the "pocket battleship" soon swung back on her original course, a fire appearing amidships as she did so.

Five minutes later the Ajax received her first heavy hit from an 11-in. shell. It put both her after-turrets out of action, reducing her armament to four 6-in. guns. In another five minutes the Exeter had to break off the action as her remaining turret ceased to operate through flooding. She had been on fire and had many casualties.

Almost at the same time the Ajax and the Achilles deliberately closed the range with the object of inflicting further damage on the enemy, in spite of the fact that at this juncture another of the Ajax's guns could not be fired owing to an accident, leaving her with only three in action. The Admiral Graf Spee turned away and zigzagged, putting out fresh smoke screens. All this time the gunfire of both British cruisers had been punishing the German ship severely.

By 7.40 the rapidity of the fire was threatening to exhaust the ammunition of the cruisers, so Commodore Harwood decided to hold off for a while and close in again at nightfall, when torpedoes might be used. For 12 hrs. the raider was shadowed, until she was well into the Plate estuary. From the fact that she had ceased firing with her after-turret it was conjectured that this had been put out of action. With the onset of darkness the cruisers closed in, regardless of an occasional 11-in. salvo, but the Admiral Graf Spee made for the port of Montevideo and anchored in the roads just after midnight. Four days later she came out of port and scuttled herself rather than renew the fight with the Ajax and the Achilles, by then reinforced by the Cumberland, mounting eight 8-in. guns. See Admiral Graf Spee; Harwood, Sir Henry; Pocket Battleship.

Francis McMurtrie

Plateau. In physical geography, a broad, flat, elevated region, or raised plain. Plateaux or tablelands may be classified as follows: (1) those built of accumulated materials; (2) those produced by the elevation of a former plain; (3) highland areas which have been denuded to plateaux. Examples of the first type are found in the W. Cordillera of N. America, and in similar highland regions.

The high plains, the famous ranching lands, stretching from Alberta to Texas, situated E. of the

Rocky mts., are plateaux caused by the raising of the adjacent plains resulting from the uplift of the Rockies. They, like similar regions E. of the Andes in S. America, and the Allegheny plateau W. of the Appalachian mts., are examples of the second type. To the third class, i.e. plateaux which are worn-down highlands, belong the Laurentian plateau of Canada, the Piedmont plateau E. of the Appalachian mts., the plateaux associated with the ancient highlands of Australia and the Highlands of Scotland. The most extensive plateau in the world is the continent of Africa, for the whole of that land mass, with the exception of the extreme N.W. and S.W., is of this type of relief. Owing to their elevation, plateaux have a cooler climate than neighbouring lowlands, but they are frequently arid.

Plateau Basalt. In geology, basaltic lava which, being very fluid, forms widespread flat flows. These flows piled one above the other form extensive plateaux. The lava is an olivine basalt, and its composition is remarkably constant wherever it occurs, so much so that many believe there is a worldwide layer of basaltic material of this character lying below the crust. Eruptions of plateau basalt are not violently explosive; the lava wells up quietly from fissures, as from the Laki Fissure (*q.v.*) in Iceland, and does not form volcanoes of the cone type. Extensive floods of plateau basalt have in the past been poured out in the Thulean area of N.W. Scotland — Iceland — Greenland; Snake river area in western U.S.A.; the Deccan, India; Patagonia, etc. See Geology; Igneous Rocks.

Platelayer. Term used for a man who lays and maintains the permanent way of a railway. Such men are so called from the type of rail first used, which was known as the plate rail.

Platen (French, *platine*). In printing, flat metal part of a press that, by pressing the paper against the type, makes the impression. A platen machine is one that has a flat as distinct from a cylindrical method of impression. See Printing.

Platen-Hallermund, AUGUST, COUNT VON (1796-1835). German poet. He was born at Anspach, Oct. 24, 1796, and entered Würzburg university in 1818, moving to Erlangen in 1819. After 1826 he lived chiefly in Italy, and he died at Syracuse, Dec. 5, 1835. In his Ghaselen, 1821 and 1823, Poems, 1833, and Polenlieder (Polish

Songs), 1831, he wrote Oriental and other pieces that contain his best work. As a dramatist he



Count von Platen-Hallermund, German poet

enjoyed success notably in the comedies *Die Verhängnisvolle Gabel* (The Fatal Fork), 1826; and *Der Romantische Oedipus* (The Romantic Oedipus), 1828, in which he assailed the ex-

ponents of the Romantic movement so strongly as to be himself bitterly attacked by Heine and other writers. Another notable play was *Die Liga von Cambrai* (The League of Cambrai), 1833. His collected works were pub. in 1839.

Plate Powder. Powder for cleaning silverware. Powdered chalk and jeweller's rouge in the proportions of three of the former to one of the latter, with enough water to make a paste, form a plate powder. It is applied wet with a rag, and polished off when dry with a soft cloth or brush.

Platinum (Sp. *platina*, dim. of *plata*, silver). Rare metallic element of great value. Spanish explorers found it in S. America before 1550 in the river sands, but the Spanish govt. would not allow it to be exported lest it be used to adulterate gold; as a result, quantities were thrown into the sea. It was first brought to England in 1741, and fused for the first time by Macquer and Beaume in 1758, by focusing the sun's rays on to it with the aid of a mirror.

The element, chemical symbol Pt, is the third transitional element in the third long period of the periodic table, being preceded by osmium and iridium, while it bears a marked resemblance to its neighbour palladium. Its atomic number is 78; atomic weight, 195.23; specific gravity, 21.4; melting point, 1,773° C.; boiling point, about 4,300° C.; electrical conductivity, 16 (silver being 100); crystal structure, face-centred cubic, with lattice constant $a = 3.915$ and an interatomic distance of 2.768 Å.u.

Quantities of platinum and the platinum metals were discovered in the Urals at the beginning of the 19th century, and these deposits remain the richest known. Other deposits of alluvial platinum occur, but except in Colombia and Abyssinia, these have been worked to ex-

haustion. In all these deposits platinum occurs chiefly in the metallic form. Crude platinum is always associated with varying amounts of osmium, iridium, rhodium, palladium, and ruthenium; also with gold, copper, and iron. The Ural mineral contains about 78 p.c. platinum, that of Abyssinia about 72 p.c., and of Colombia about 85 p.c. Up to 1916 over 90 p.c. of the world's production came from these deposits, but since then the main source has been the low-grade copper nickel ores of Sudbury, Ontario, Canada. Although this ore does not contain more than 0.007 fine oz. of platinum per ton, this becomes concentrated with the copper and nickel, and thousands of tons of ore are worked annually. World production is some 500,000 fine oz. a year.

The alluvial deposits are treated for recovery of the platinum metals by hydraulic concentration, and the crude metal is delivered to the refineries for further treatment. The Canadian ores need different treatment. Most of the platinum metals in them are recovered from anode slimes, resulting from the electrolytic refining of the base metals.

Methods of Refining

The crude metal, anode slime, or jewellers' scrap, is refined by a wet process. Preliminary concentration is carried out by smelting with lead, the lead ingots being cupelled and the silver-rich precious metal alloy attacked with sulphuric acid, which dissolves out the base metals and silver, leaving gold and the platinum metals. The residue is attacked with aqua regia, resulting in solution of gold, platinum, and palladium, but leaving rhodium, iridium, ruthenium, and osmium undissolved. The soluble portion is treated with ferrous sulphate to precipitate the gold, which is filtered off, refined, and marketed. Ammonium chloride is added to the filtrate, giving a precipitate of ammonium platinum chloride. After this has been ignited to sponge platinum, the liquor is made ammoniacal and the palladium is precipitated as palladous ammine chloride by the addition of an excess of hydrochloric acid, and this is ignited to crude palladium, which can be similarly refined. The insoluble portion from the aqua regia attack is smelted with lead, cupelled, and parted with nitric acid.

Rhodium is extracted by fusion with potassium bisulphate and

precipitated several times as ammonium rhodium nitrite, which is converted to the chloride and ignited to metal. The residue is fused with potassium hydroxide and nitre, giving soluble ruthenium and osmium compounds, leaving the iridium undissolved. This insoluble portion is dissolved in aqua regia and treated for precipitation of ammonium chloridate, which, after refining, is ignited to iridium. Ruthenium and osmium are distilled off from the filtrate and ultimately separated by volatilisation of osmium tetroxide. By this process each of the platinum metals is obtained pure.

Platinum is a white metal with a high metallic lustre, similar in appearance to silver, but with a greyish tinge. The metal, obtained in the form of sponge, can be compressed in a steel mould under a pressure of 5 tons per sq. in. and heated to 1,500°C., so forming an ingot which can be forged. It can be melted by an oxy-hydrogen flame in a stone hearth; more quickly in a high-frequency induction furnace. The ingot can be forged and rolled red-hot and finally either drawn or rolled cold, being readily reduced to foil or wire of a diam. less the 0.0005 in. By a special process even finer wire down to 0.00003 in. diam. can be produced. The annealed metal has an ultimate tensile strength of 10 tons per sq. in. with an elongation of 40 p.c. and a Vickers hardness of

50, but by cold work the tensile strength can be increased to 15 tons per sq. in. and the hardness to over 120. Platinum can readily be hammer- or fusion-welded. It does not oxidise even at high temps. Aqua regia will dissolve it, but it is virtually unattacked by other acids and only slightly by alkalis. It forms low-melting alloys with several metals.

Apart from its use in fine jewelry, platinum is widely used in the electrical industry for contacts, for which purpose it may be alloyed with iridium or ruthenium to make it harder. The wire is used for lead-in wires in thermionic and X-ray valves. Platinum resistance thermometers are used for precision measurement of extreme temps.

In chemical engineering, platinum is used for crucibles for molten glass and containers for corrosive chemicals; also as a catalyst. Platinum and its alloys have many applications in the dental industry, for laboratory ware, and for spinnerets for making glass fibre and rayon.

Platinum is available in several grades, the normal commercial alloy containing a small amount of the other platinum metals to increase hardness, while the purest, used for thermocouples, exceeds 99.999 p.c. platinum. For chemical plant, platinum of 99.99 p.c. purity is used. See Copper; Iridium; Gold; Osmium; Palladium; Rhodium; Ruthenium; Thermocouple. F. D. L. Noakes

PLATO AND PLATONISM

T. Callander, M.A., Former Professor of Greek, Queen's Univ., Canada

Related articles are those on Aristotle; Socrates; and other great philosophers. See Academy; Idea; Neo-Platonism; Philosophy; Sophists; also Greece; Greek Literature

Born at Athens, or in the island of Aegina, of distinguished family, Plato spent most of his life in the city of Athens, immersed in the study and the teaching of philosophy. He is said to have visited Egypt, Magna Graecia, and Sicily, and to have been captured and sold as a slave at Aegina, but the trial and execution of his teacher Socrates, 399 B.C., was by far the most moving incident in his long career.

Henceforth there was only one career for him, to carry on the mission of his martyred teacher. The record of that mission is set forth in the rich collection of Dialogues that have come down to us. Of the 35 treatises—many critics reject the Letters—ascribed to Plato, some 24 are probably

from his hand. Through these works his influence has been perpetuated throughout the civilized world to the present day.

In the make-up of Plato are discerned three strains seldom found so conspicuously united in a single mind. The acuteness and subtlety of the logician, the imagination of a seer and poet, and the enthusiasm of a shrewd but austere moralist are his in the highest degree. Typical of the first is the Theaetetus, with its keen analysis of logical scepticism as taught by Heraclitus and Protagoras; the second strain is dominant in the Phaedo and Phaedrus; the third in the Laws; while the Republic exhibits in perfection the blending of all three.

Plato, or Aristocles, as he was

originally named, was born two years after the death of Pericles, and the world in which he grew up was one possessed by a desire to correct and restore the distracted social and political system of Hellas. That system culminated in the city state of Athens, a thoroughgoing democracy. Plato set himself to understand Hellenic society in all its extent and depth, with the practical object of pointing out weaknesses and indicating reforms. In so doing he struck out a system of philosophy based on contemporary experience, designed to set forth the principles of life and conduct exhibited therein. The note of his conclusions everywhere is idealistic, and the whole question of the interpretation of Platonism depends on an understanding of these "ideas."

Theory of Knowledge

In discussing logical and metaphysical problems, Plato took over certain results attained by his predecessors, including Socrates. His primary task here was the refutation of various logical heresies advocated by famous philosophers or sophists, these comprising the leading educators of the period, in which sense Socrates himself was a sophist. To take an example: There was a treatise by Gorgias, written to maintain the disconcerting thesis—nothing is; if anything is, it cannot be known; if anything is and can be known, it cannot be expressed in words. As against this nihilistic doctrine, Plato built up a theory of knowledge that would account for the fact that men know and reason and act intelligently in a world not wholly incomprehensible.

Plato's argument starts from certain assumptions, of which three are often combined to form the outline of a logical theory, more or less consistent. First, it is plausible to hold that the world of things is composed of particular objects, all existing independently, despite mutual action and re-action; secondly, within the world of knowledge we are aware of a collection of thoughts each different from all the rest; again, particulars in the external world, objects in space, appear to have an existence of their own, separate and independent of thoughts about them. Plato, in his long series of dialogues, forces to the front the truer view: first, that the multitude of objects in space, while each is separate and individual, yet possess each a character which is shared by other objects; secondly, that the simplest thoughts, although they occur as particulars, are likewise each recognizable as

more or less the same as other thoughts; thirdly, that things in space not merely correspond to thoughts in the mind, but that they are capable of being known.

Particular things and particular thoughts are, he holds, what they are because, somehow, they embody a universal nature or form. As to particular objects in space, we are easily led to allow that there are such "universals," which enable us to recognize instance after instance of the same object in the external world. Further, we admit readily that thoughts in the mind may exhibit a sameness which in this region too compels us to con-



Plato, Athenian philosopher

cede these universals. But, when we are asked to admit that there is a common ground or character as between objects in space and thoughts in the mind, we are far from unanimous. The vast majority of philosophers part from Plato here, and diverge into the numerous forms of nominalism, sensationalism, and materialism which deny the ultimate identity of thought and things.

Particulars and Universals

The effort to expound the true relation of universals to particulars absorbs a great deal of Plato's energy. It speedily led him to lay stress on thought as the active principle in the world which we know. Ideas, he argues, are in the last analysis the substance of the world which we experience, and much of his language lends itself to the popular picture of this system as one which confused ideas with solid realities, and maintained that ideas were real and things unreal. This picture of Platonism ignores his strenuous search into the true relations between particulars and universals, facts and ideas. It cannot be said that Plato quite satisfied himself

as to his exposition of that relationship. He tried "imitation," "communion," "participation," as explanations, and found none of them adequate. His conclusion, however, is not far removed from that summed up in a modern formula like "identity in difference." Plato's dictum "what is wholly real is wholly knowable, and what is utterly non-existent is completely unknowable," answers to the modern assertion of "the unity of the intelligible world with itself and the mind that knows it."

His Idea of the Good

In the region of ethics and politics, Plato was the first thinker to offer a satisfying account of the principles that form and govern conduct and character. Socrates had dealt with the fluid and confused conceptions about right and wrong, vice and virtue, by persistent questioning of all who were thrown in his way. By exposing the contradictions involved in popular opinions about these matters, Socrates gradually moved towards a solution of his own perplexities; and the most remarkable of his conclusions is the familiar "virtue is knowledge." The intellectual aspect of morality implied by this definition, indeed, is frequently arraigned as a prejudice infecting Greek ethics in general. It is too much a matter of the head, too little of the heart; and the stress in that respect is differently placed in Christian ethic. But in Plato morality is far from being intellectual in the sense of abstract at any rate. Plato's "justice" is the virtue of the good citizen, and his idea of the good is to be realized in the life of the commonwealth. In the Republic it is from the larger life of the justly organized state or society that he reads off the features of the good life of the individual. Here is the embodiment, the actuality, even if imperfectly attained, or the idea of the good, which for Plato solves the riddle of the universe. In this idea of the good, which corresponds to the Christian God, he finds not merely the end of life, but the ground and cause of all existence.

The influence of Plato is to be estimated by the numberless thinkers and poets who have drawn inspiration from him. Plato was succeeded by disciples who undertook to carry on his teaching; but his true successor was Aristotle, who developed Platonism on more scientific lines.

Bibliography. Works, Complete Latin Text with Notes, 10 vols., G. Stallbaum, 1858-60; J. Burnet, 6 vols., 1908-13; Eng. trans., 4 vols., B. Jowett, 3rd ed. 1892; Dialogues with Eng. notes, Phaedrus,

Player Piano. Diagram showing mechanism of an Angelus player piano
By courtesy of Sir Herbert Marshall & Sons, Ltd

particular note. The bellows act on the suction principle, the notes of the piano being actuated by the air which is drawn in when the holes in the perforated roll coincide with those in the tracker-bar. By levers the speed and the soft and sustaining pedals can be controlled, and expression and special melodic effects secured.

A later development was the introduction of separately controllable mechanism which reproduced with the utmost fidelity the individual performances of great artists. The piano is thus available in three distinct ways: (a) as an ordinary instrument; (b) as a mechanical player giving the performer's own interpretation; and (c) as a reproducer of the performances of celebrated pianists.

Playfair, LYON PLAYFAIR, 1ST BARON (1818-98). British chemist and politician. Born at Chunar, Bengal, May 21, 1818, and educated at St. Andrews and Glasgow universities and at Giessen, he became in 1842 professor of chemistry at the Royal Institution, Manchester. He was appointed chemist to the geological survey, 1845, and professor at the school of mines. He carried out a series of important investigations into nitroprussides, coals for steam navigation, the gases of the blast furnace, etc. Professor of chemistry at Edinburgh in 1858, in 1868 he was elected M.P. for Edinburgh and St. Andrews universities. In 1873 he became postmaster-general, presiding in 1874 over a commission on the civil service which introduced a new system called the Playfair scheme. He was M.P. for South Leeds in 1885, was made a peer in 1892, and died May 29, 1898.

Playfair, SIR NIGEL (1874-1934). British actor and theatrical manager. Born in London, July 1,



Sir Nigel Playfair,
British actor

1874, he made his stagedébut at the Garrick Theatre, London, in 1902, and developed into a character actor. He assumed control in 1918 of the Lyric Theatre, Hammer-
smith
(*q.v.*), where as sponsor of notable productions he revived interest in Restoration and 18th century drama, *e.g.* The Beggar's Opera (*q.v.*); The Way of the World; The Rivals. Other successes included an intimate revue, River-

side Nights, 1926; A. P. Herbert's Tantivy Towers, 1931. Playfair, who was knighted in 1928, severed his connexion with the Lyric in 1932. He died Aug. 19, 1934. He published The Story of the Lyric Theatre, 1926; Hammer-smith Hoy, 1930.

Playhouse, THE. London theatre situated in Northumberland Avenue, W.C.2. Built on the site of the Avenue Theatre which was partially destroyed in 1905, it was opened Jan. 28, 1907, under the management of Cyril Maude (*q.v.*), the first production being Toddles. Gladys Cooper, who had appeared here in 1920 in Home and Beauty, and who leased the theatre during 1927-33, played on its stage in many dramas and comedies, *e.g.* The Sacred Flame, 1930; The Painted Veil, 1932; The Rats of Norway, 1933. The theatre seats 679.

Playing-Card Makers, THE. London city livery company. It was granted a charter Oct. 22, 1628. The office is at Dacre House, Arundel St., London, W.C.2. See Cards, Playing.

Plea (late Lat. *placitum*, decree, decision). Formerly, a document in which the defendant in an action answered the plaintiff's declaration or statement of claim. A plea might be to the merits, or it might be in bar, or it might be a dilatory plea. The science of pleading was highly technical, and there was a race of great lawyers who did little else but draw these documents. The plea is now abolished, except in the lord mayor's court, London. Pleas of the crown is the English legal term for all criminal suits or causes in which the sovereign appears as the plaintiff.

Pleadings. In English law, the documents in which the plaintiff and defendant respectively state their cases. When, therefore, the case comes into court, the parties and the judge know what is the issue to be tried. Under the present system the plaintiff must first set out the facts on which he relies in a statement of claim. The defendant answers in a defence, in which he either admits or denies each or any of the plaintiff's allegations, and sets out also any affirmative facts on which he relies for a defence.

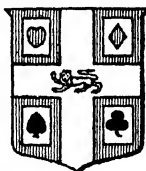
Pleasure (Fr. *plaisir*, from Lat. *placere*, to please). An agreeable state, due either to physical sensations or to a variety of

mental causes. These are originally of three kinds: those caused by exercise of body or mind; the pleasure of achievement; specific pleasures which accompany satisfaction of instinct, *e.g.* eating. To these are added as experience accumulates the pleasure of anticipation and other states of stimulation. Even the presence of danger may afford this type of satisfaction, but such tension passes over into pain if unduly intense or prolonged.

All healthy creatures seek pleasure and avoid pain. In human beings this mechanism is controlled to a large degree both by reason and by conscience. Neurotics who suffer from feelings of excessive guilt may reach a point where they cannot experience pleasure without its causing anxiety (see Inferiority Complex). Other anxious and guilty types feel a continuous need for pleasure, *e.g.* criminals seldom save money or put it to any useful purpose.

Psychologically, pleasure is a good. It alleviates anxiety, lessens irrational guilt, and encourages important virtues. A human being tends to be more reasonable, generous, and tolerant when happy than when suffering from frustration or pain. A thing that gives pleasure must be regarded as good, unless this attribute is swamped by other effects of the activity, *e.g.* in drug addiction. Most philosophers recognize pleasure as a major good; some think it the only good. Most religions regard it with suspicion if not with entire disapproval; Buddhists and Taoists consider that blessedness can be achieved only by the renunciation of all earthly desire. The common tendency is to divide pleasures into innocent and guilty, placing emphasis upon the danger of those connected with the sexual instinct. Most psychologists, however, would agree that the value of any pleasure must depend entirely upon its actual results in a given case and at a given time, *i.e.* upon its effects on the mental and physical health of the individual. See Pain.

Plebeian. Name given to the common people (*plebs*) of ancient Rome, as opposed to the ruling order of patricians. They were originally the subject peoples, resident aliens, and even fugitive slaves; but, as time went on and many of them attained to wealth and influence, they demanded some share of the political power which the patricians kept



Playing-Card
Makers' arms

in their own hands. The struggle lasted more than 200 years. In 494 B.C. the plebeians gained the right of electing special magistrates of their own, called tribunes: in 451 the Decemvirate was created to codify the laws and equalise them as between the two orders. The republican magistracies were successively thrown open to them, ending in 300 with the last of the priestly offices. See Patrician; Rome; Tribune.

Plebiscite (Lat. *plebs*, people; *scitum*, degree). Term originally applied to a law passed by the Roman people assembled in *comitia tributa*, i.e. by tribes. Such laws, at first binding only on the plebeians, or commons, were subsequently extended. In modern usage, a plebiscite is a vote by all enfranchised persons on a clearly defined issue. Such a vote decided the election of Louis Napoleon as prince-president of France in 1848, and again three years later. After the First Great War some frontier districts of Germany, notably Upper Silesia and S. Slesvig, voted to decide to what state they should belong. In 1935, a plebiscite of the local population returned the Saar to Germany. A plebiscite held in Greece in 1946 resulted in a vote by more than two to one for the king's return.

Essentials for carrying out a plebiscite so as fairly to reflect the will of the people are the careful framing of questions. In Austria in 1938, the chancellor, Schuschnigg, offered to put two questions to the electors: "Are you for the independence of Austria with Schuschnigg; yes or no? Are you for the independence of Austria without Schuschnigg; yes or no?" This proposal did not satisfy the Germans, who occupied the country by force on the night on which the plebiscite was to have been held. By the plebiscite held under German auspices a month later, over 99 p.c. of the electorate approved the Anschluss—a much higher proportion than would have been likely without intimidation. *Pron.* plebbissit. See Referendum.

Pledge. The delivery of goods by a debtor to a creditor as security for a debt. Pledges given to pawnbrokers are subject to special rules. The pledge which total abstinence societies invite the public to sign is a promise to become a life-long abstainer from alcoholic liquors. The actual form, of course, varies with different societies. See Pawnbroker.

Pléiade, THE. Group of seven 16th century French poets, Pierre de Ronsard, Joachim du Bellay, Daurat, Baif, Rémy Belleau, Jodelle, and Pontus de Thyard. They occupy an important position in literature from their determination to treat of great subjects. Consult Ronsard and La Pléiade, G. Wyndham, 1906; Literary History of France, E. Faguet, 1907.

Pleiades. In Greek mythology, the seven daughters of Atlas and Pleione, and companions of Artemis. When pursued by Orion they prayed to be turned into doves. Their prayer was granted, and they were placed among the stars.

Pleiades. In astronomy, a group of conspicuous stars marking the shoulder of the constellation of Taurus. To the eye six stars only are usually visible, but in the telescope over 2,000 can be seen. A typical open galactic cluster, the group is about 35 light-years in diameter and lies at a distance of 350 light-years, immersed in diffuse nebulosity.

Plein Air School. Name given to those painters who followed Manet in aiming at the realistic rendering of objects in full daylight, rather than in the modified and controlled light of a studio.

Pleistocene (Gr. *pleistos*, most; *kainos*, new). In geology, name given to the period of time between the end of the Tertiary and the beginning of history. It is also known as Post-Tertiary, Glacial, and Ice age, the two latter from the fact that it was a period of great cold and glacial formation. See Glacial Period; Horse; Ice Age; Megatherium; Tertiary.

Plender, WILLIAM PLENDER, BARON (1861-1946). British accountant. Born Aug. 20, 1861, he became senior partner of the firm of Deloitte, Plender, Griffiths and Co. in 1904. He served on the committee on Irish finance, 1911; the royal commission on railways, 1913; the committee on national expenditure, 1931; the coal mining royalties tribunal, 1937. Knighted in 1911, baronet in 1923, raised in 1931 to the peerage, the first chartered accountant so honoured, he died Jan. 19, 1946, leaving no heir.

Plenipotentiary (Lat. *plenus*, full; *potentia*, power). Diplomatic representative. He is accredited direct to the sovereign or head of the state. His full title is

envoy extraordinary and minister plenipotentiary. See Ambassador; Diplomacy; Envoy.

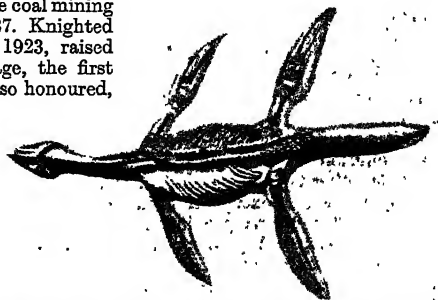
Plenty, BAY OF. Wide opening of the N.E. of North Island, New Zealand. Motiti, Mayor, and White are the chief islands. Numerous Maori settlements occur between the bay and Rotorua. Capt. Cook discovered the bay in 1769 and gave it its name.

Pleochroism. Optical property shown by certain minerals which absorb light differentially in different crystal directions. Sections or grains of some non-opaque minerals assume different colours as they are rotated on the microscope when viewed by transmitted plane-polarised light. Tourmaline, biotite, and many amphiboles show pleochroism.

Pleonaste. Name given to a mineral of the spinel group. In pleonaste the usual magnesium is partly replaced by iron. It is a black opaque mineral found in gneiss and the ejecta of some volcanoes. From its occurrence in Ceylon it is sometimes called ceylonite, or ceylanite.

Pleroma (Gr., fullness). Term meaning that which is filled or that which makes up the fullness. Of frequent occurrence in the N.T., it is used of God or Christ (John I, v. 16; Col. 1, v. 19; 2, v. 9; Eph. 1, v. 23; 3, v. 19; 4, v. 13). It implies the fullness of the Divine attributes which dwell in Christ and that of the virtues displayed by Him, both of which are imparted to true believers, as suggested in the parable of the vine and its branches, and should therefore animate the ideal Church. See Kenosis.

Plesiosaurus (Gr. *plēsios*, near; *sauros*, lizard). Extinct marine reptile found as fossil remains in Liassic rocks. Members of the order Sauropterygia, they had thick, lizard-like bodies, long flex-



Plesiosaurus. Fossil skeleton of the extinct marine reptile Victoria and Albert Museum, S. Kensington

ible necks with small heads, strong tails as long as the body, and powerful paddles for swimming. The length of the animal varied from 10 to over 40 ft., according to the family to which it belonged, and the jaws of the relatively small head were armed with powerful teeth, those of *pliosaurus* measuring 1 ft. in length. They must have been very common in the seas of the Lias. In 1928 the skeleton of one of these reptiles was unearthed at Harbury, Warwickshire, and is now in the Natural History Museum, South Kensington. See *Dinosaur*; *Lizard*.

Pleurisy. Inflammation of the pleura (*see* Lung), the serous membrane which covers the lung and forms the pleural space, in which the lung can move freely. There are two forms—dry or fibrinous pleurisy, and pleurisy with effusion.

Dry pleurisy can follow exposure to cold; it is a usual sign at the onset of pneumonia, and common in cases of pulmonary tuberculosis. The patient complains of acute pain, worse with every breath and with the dry cough which accompanies it. The sounds of friction are heard through the stethoscope; they are caused by the movement of the roughened surfaces of the membrane. The disease can cause adhesions between the two layers; these usually disappear in pneumonia, but where the disease is a sign of tuberculosis they become permanent. They may interfere with the movement of the lung, and can cause failure of the treatment of pulmonary tuberculosis by artificial pneumo-thorax (*see* Tuberculosis).

Sometimes dry pleurisy occurs at the base of the lung—diaphragmatic pleurisy. In this case the patient complains of pain in the shoulder of the same side. The condition can occur after chills or exposure; but is often a sign of tuberculosis, and sometimes indicates the presence of abdominal disease, particularly conditions which affect the liver. Occasionally intercostal nerves are inflamed by exposure and produce discomfort in the side of the chest; this is called pleurodynia, and is not connected with the lung.

Wet pleurisy, called also pleurisy with effusion, is more common than the other type. The onset is usually the same, except that in children and in elderly people it is often insidious. A predisposing factor is exposure, and while the underlying causative lung condition at all ages may be pneumonia or broncho-pneumonia, the

diagnosis of tuberculosis must always be considered, especially in adolescence and early adult life. At ages over 45 the possibility of a new growth in the lung or on the pleura should be borne in mind. As fluid is present in the pleural space, it compresses the lung, altering breath sounds to the stethoscope. Temperature lasts for a variable time and takes longer to subside where there is an underlying lung disease. In all cases a sample of fluid should be withdrawn by the physician, in order to examine its colour and consistency, and in particular to find its cellular and possible bacterial content. All cases of wet pleurisy should also have X-ray examination.

Every case of pleurisy in adolescent or adult life should be considered as tuberculous unless proved to be otherwise. The safest course is to avoid return to ordinary conditions of life and work within four months after the temperature is normal. It has thus been found possible to avoid the breakdown with active tuberculosis of the lung which often occurs three or four years after inadequate treatment.

Plevna or PLEVEN. Town of Bulgaria and capital of the co. of the same name. It stands about 90 m. N.E. of Sofia, on the Sofia-Varna rly., and has a branch line to Nikopolis, on the Danube. It is famous as the scene of great battles and of a siege (*v.i.*) in the Russo-Turkish War, 1877. Normally it has a large trade in cattle, and the country around produces good wine. Pop. 31,520. Plevna co. covers 5,960 sq. m. Pop. 996,686.

Plevna, SIEGE OF. Incident in the Russo-Turkish War of 1877. After its occupation by Osman Pasha, with an army of some 10,000 men, the Russians advanced against Plevna in the middle of July and invested the town. After a brief bombardment, they launched an attack, which was repulsed by the Turks with heavy losses, July 20. Five weeks later a second attempt was defeated with heavy losses. Extensive preparations were then made by the Russians, who collected 100,000 men and over 400 guns. Osman's troops numbered 30,000, and gave battle, Sept. 6-7, despite a furious Russian bombardment, succeeding in repulsing the Russians, who had called in Rumanians to their aid. But the investment of Plevna was tightened, and by Dec. 9 Osman found himself starved into submission, having withstood the

enemy's attacks with the utmost gallantry for over four months.

Pleyel, IGNAZ JOSEF (1757-1831). Austrian composer. Born at Ruppersthal, June 1, 1757, he became a pupil of Haydn. After having served as choirmaster at Strasbourg Cathedral, he conducted concerts in London and then settled in Paris, where he founded a piano business, which still flourishes, and where he died, Nov. 14, 1831. Pleyel composed much—symphonies, quartets, and an opera—but most of his work is now forgotten.

Plimer, ANDREW (1763-1837). British miniature painter. Born at Bridgwater, Somerset, he settled in London, and exhibited constantly at the Academy from 1786. His most notable miniatures were those of the Rushout family, especially the group of the Three Graces, representing the daughters of Lady Northwick. He died Jan. 29, 1837. His elder brother, Nathaniel (1751-1822), also made some reputation as a miniaturist.

Plimsoll, SAMUEL (1824-98). British politician. Born in Bristol, Feb. 10, 1824, and educated at



Samuel Plimsoll,
British politician

Penrith and Sheffield, he became a clerk in Sheffield, and in 1851 was honorary secretary for the Great Exhibition. In 1853 he settled in London as a coal mer-

chant and made attempts to enter parliament. He had already given much attention to the loss of life at sea caused by unseaworthy ships being sent out, and his entry into the house of commons as Radical M.P. for Derby, in 1868, gave him opportunity to draw attention to the subject. He introduced bills and wrote *Our Seamen*, 1872, the first result being the appointment of a royal commission, and the second the important Merchant Shipping Act of 1876. He resigned his seat in 1880, and spent the rest of his life in attempts to improve the conditions of seamen. He died at Folkestone, June 3, 1898.

Plimsoll Mark. Circle with a horizontal line drawn through it carried on both sides of all British-owned merchant vessels. It indicates the maximum depth to which they may be loaded, according to the season and the ocean, and takes its name from Samuel Plimsoll. *See* Load Line.

Plinth (Gr. *plinthos*, brick or tile). In architecture, the plain surface under the base moulding of a column or any other member. In classic building it was a low, square block, and square or octagonal plinths were retained long after circular capitals had become universal. In joinery, the plinth is the broad, flat part of a base board. See Architecture; Column; Masonry.



Plinth beneath base of a column

Pliny (A.D. 23-79). Roman soldier and writer, whose full name was Gaius Plinius Secundus. He was called Pliny the Elder to distinguish him from his nephew. Born at Novum Comum (Como), he went to Rome at an early age, and, having entered the army, held a cavalry command in Germany. He returned to Rome in 52, and, after some years spent in his native place, was in 67 appointed procurator in Spain. His last official post was that of commander of the fleet at Misenum, when he met his death at the eruption of Vesuvius, which he had gone on shore to examine. His nephew in his Letters has left a detailed account of his end. A man of unwearied industry, he was a prolific writer.

In addition to a handbook on using the lance, histories of the wars with Germany and of his own times, a manual of rhetoric, and a grammatical and stylistic treatise, he was the author of an encyclopedic work entitled *Natural History* (in the widest sense) in 37 books, dedicated to the emperor Titus in 77, in the compilation of which he read more than 2,000 volumes. After a general introduction, a sketch of the phenomena of the universe, and a gazetteer, the work deals with anthropology, zoology, botany, materia medica, mineralogy, painting, and sculpture. The whole is an ill-arranged collection of notes, but in the Middle Ages it was much read and imitated. There is an Eng. trans. with notes, J. Bostock and H. T. Riley, 1855-57.



Pliny, Roman writer From a statue

Pliny (A.D. 61-c. 113). Roman writer, whose full name was Gaius Plinius Caecilius Secundus. He was called the Younger to distinguish

him from his uncle. Born at Novum Comum (Como), he was adopted by his uncle, from whom he received an excellent education. Beginning as a pleader in the law courts, he had a successful public career, becoming quaestor in 89, tribune in 91, praetor in 93. His correspondence with the emperor Trajan when he was governor of Bithynia (c. 111) shows Pliny to have been possessed of high ideals, though narrow in outlook and lacking in initiative.

This correspondence is of peculiar interest, inasmuch as it contains Trajan's rescript on the treatment of Christians. Another letter is that to Tacitus describing the eruption of Vesuvius in 79 in which the elder Pliny lost his life. Pliny's Letters, published in nine books, suffer from the fact that they were obviously written for publication; to a certain extent they lack freshness and spontaneity. Yet they are of great value for the light they throw upon the life of the time. An edition by W. M. L. Hutchinson came out in 1915.

Pliocene (Gr. *pleion*, more; *kaínos*, new). In geology, name given to the uppermost division of the Tertiary system. Pliocene deposits are chiefly found in Europe, especially in France, Spain, Italy, Greece, and on a smaller scale in England, Belgium, etc. Norfolk and Suffolk crag, the Coralline crag, etc., consisting of shelly sand and clays, represent the Pliocene deposits in England. The Pliocene is comparatively poorly represented in N. America, though the Merced series of San Francisco run to a thickness of 6,000 ft.

The Pliocene deposits, the accumulations of shallow seas, and the estuaries of large rivers, are rich in fossils, particularly of molluscs, extinct fishes, reptiles, amphibians, and birds. The remarkable fossil of *Pithecanthropus erectus* (q.v.) probably belongs to this geological epoch. See Tertiary.

Plöck. Town of Poland, capital of the dist. of the same name. It stands on the right bank of the Vistula, 60 m. W.N.W. of Warsaw. There are manufactures of agricultural implements, matches, sugar, and soap; grain, timber, and sugar-beet are exported. There is steamer traffic by river to Warsaw. The 12th century Romanesque cathedral contains tombs of Polish dukes and kings. Plöck was formerly the capital of the principality of Masovia. It was captured by the Germans in their invasion of Poland in 1914, and was the scene

of a fight between Bolshevik and Polish troops in 1920. Overrun by the Germans in the second week of Sept., 1939, it was in German hands until liberated Jan. 21, 1945, after being bypassed two days earlier, during the rapid Russian advance into E. Prussia. *Pron.* Plotsk.

Ploegsteert. Village and wood of Belgium, in the prov. of W. Flanders. Known as Plug Street to British troops of the First Great War, the village is 8 m. S. of Ypres, and figured prominently in operations conducted by the British in the Ypres salient. Here is a memorial to 11,447 missing men. See Ypres, Battles of.

Ploesti. Town of Rumania, in Bucegi dist., 35 m. almost due N. of Bukarest. A centre of the great Rumanian oil industry, as a junction of railways and roads it is strategically important. During the First Great War it was captured by the Austro-Germans, Dec. 6, 1916. As Germany's main source of natural oil after 1941, it was heavily attacked by Allied aircraft in the Second Great War. The Germans fought bitterly against the Russians to hold Ploesti, Hitler having issued an order that it was to be held at all costs; but it fell Aug. 30, 1944, to troops of the 2nd Ukrainian army. Pop. 105,114. *Pron.* Ploy-esh-ti.

Plombières. Town and watering-place of France. In the dept. of Vosges, it stands in the valley of the Augronne, 7 m. S.W. of Remiremont, and is famous for mineral springs. Good for gout, rheumatism, and nervous complaints, these were known to the Romans, and there are remains of their extensive baths. Napoleon III, by frequent visits to Plombières, made it fashionable, and it was here in 1858 that he arranged with Cavour to assist Sardinia against Austria. The springs, 27 in number, are the property of the state. The chief buildings are the bathing establishments, casino, and others for the comfort and pleasure of visitors. The chief street is the Rue Stanislas, which took its name from Stanislas, duke of Lorraine.

Plöner See. Lake of Slesvig-Holstein, Germany. Midway between Kiel and Lübeck Bay is a group of lakes of glacial origin set amidst beech woods. The largest are Eutin and the Great Lake of Plön; others are Lanker, Keller, and Diek. The great lake is 6 m. long, 5 m. wide; on its shores is Plön, a steamer station, which reaches W. to the small Plön lake.

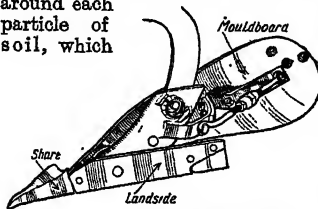
Plotinus (c. 205–270). Roman philosopher. Except that his parents were Roman, and he was born in Egypt, little is known of his early life because his contempt for material things led him to refuse to discuss them. He appears to have adopted early an asceticism, but it was free of any masochistic trait. About 233 he moved to Alexandria, where he came under the influence of Ammonius. He accompanied Gordianus to Persia in 242 to study eastern philosophy, but returned after the murder of the other. Teaching in Rome, Plotinus induced many of the wealthy to realize their property and embark on a life of asceticism. About 265 he secured from the emperor Gallienus two cities in Campania where he proposed to set up a replica of Plato's Republic; but difficulties had not been overcome before he died at Puteoli.

Plotinus has become to posterity a figure of great importance. He represents the attempted synthesis of all Hellenic wisdom, and is often regarded as the last great Grecian philosopher; but also he is the founder of Neo-Platonism, a doctrine of supreme influence in the history of Christianity. His teaching was based on the Platonic theory of ideas, into which he tried to incorporate the learning of Anaxagoras and Parmenides. His system arranges the universe in a number of planes which form a hierarchy; on each plane the soul has affinities, but the higher, non-material planes are most worthy of man's contemplation. The influence of Plotinus is found not only in all Christian philosophy, but upon all the realists from Spinoza to Whitehead. His *Enneades*, 54 treatises, were first edited by Porphyry and published in a Latin translation by Ficinus in 1492; the best-known English translation is by S. MacKenna, 1917. The finest English authority is W. R. Inge, whose standard works include *The Religious Philosophy of P.*, 1914, and *The Philosophy of P.*, 3rd ed. 1928.

Plough or Plow. Woodworking tool for "ploughing out" grooves. In contradistinction to other grooving planes, the fence of the plough can be set so that the grooves may be quite near the edge of the work, several inches away, or any distance between. There is a set of plough irons (usually eight) varying in width from $\frac{1}{8}$ in. to $\frac{1}{2}$ in.

Ploughing. Method of preparing the soil for crops. In the

cultivation of the soil, the plough is the most widely used implement. Although there are references to ploughing in the authorised version of the O.T., the modern plough has undoubtedly been developed from that used by the Saxons. The principle has always been the same: to invert the soil so that any vegetation or manure is buried and the underside of the soil exposed to the action of weather. With mechanical power almost any soil can be pulverised sufficiently to give what is called a seedbed or tilth; but the best tilth, which remains friable for weeks or even months, is obtained by weathering after ploughing. This leaves a film of moisture around each particle of soil, which



Ploughing. The body of a plough, showing principal parts

reduces the tendency of many soils to set hard after rain.

The plough is therefore the basic tillage implement. The backbone or beam of a plough for horse draught is a slightly bent steel member to which the following parts are attached: (1) Hake and chain, to which the horses are coupled. (2) Wheels; a furrow wheel to run in the furrow and a smaller land wheel to move along the unploughed side. The relative height and horizontal distance between these can be adjusted, so as to regulate the depth and breadth of the furrow. (3) Coulter, a knife for making the vertical cut in the furrow slice; its length and angle can be adjusted, and it is sometimes in the form of a revolving cutting disk. (4) Skim coulter, a sort of little ploughshare, used to pare off surface vegetation or turn in a top dressing of manure. (5) Handles, or stilts, used by the ploughman for guiding the plough.

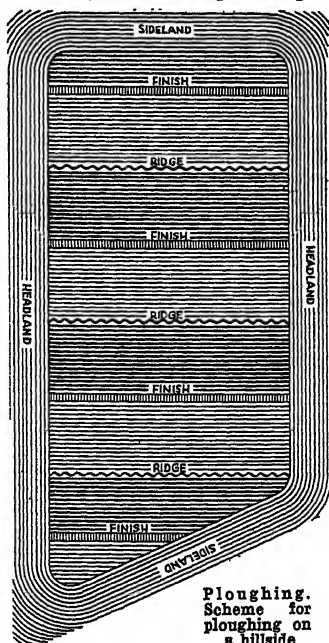
The general pattern described was set in 1730 by the Rotherham plough. Shares were first used about 1785, and in the early 19th century types of breast or mould-board were introduced to meet the different requirements of autumn and spring work. A long breast with gentle twist (lea type) to set up the furrow slice on edge is used for autumn work; the short,

sharply-curved breast of the digger breaks up the slice in spring. That is the guiding principle, but a compromise between the two types is often used at any season.

Ploughing matches came into vogue at the end of the 18th century and still serve a useful purpose in encouraging efficient work, i.e. neat, straight, and complete inversion of the soil with ploughs adjusted to do their work with minimum draught and wear.

The one-way plough is reversible so that it may work to right or left. It carries two ploughing bodies secured above and below the beam so that one plough is in the air while the other is in use. They swing over at each end of the field for the return journey. On a disk plough the disks, usually about 24 ins. in diameter, are mounted at an angle so that they act as a scoop; but this method is not suitable for the general run of British conditions.

Up to the 1920s nearly all ploughing was done by horses, teams up to eight being used for such deep work as preparing for potatoes, although the more common sight was a pair with one man driving them and controlling the plough at the same time. With the development of the internal combustion engine for land use, ploughing was the first task to be mechanised. A 25-h.p. tractor pulls two or three furrows simultaneously, each cutting to a depth



Ploughing. Scheme for ploughing on a hillside

of about 8 ins., with 10 or 12 ins. as the customary depth. A standard figure for the power required for ploughing medium soil is 7 lb. per sq. in. of furrow cross-section. With crawler tractors of 90 h.p., work up to 30 ins. in depth is not unusual in Lincolnshire, and there is a general tendency to plough to a greater depth in all parts of the country.

Ordinarily, the soil is turned to the right hand, so that to start ploughing a ridge is formed by driving across the field, turning round, and coming back alongside the first cut. Several of these ridges are formed parallel to one another and furrows turned round and between them. The headland, which is left for turning, is ploughed when the main part is finished. In a few districts short turns at each end are avoided by ploughing round and round. The modern tendency is to mount the plough at the rear of the tractor so that it becomes an integral part of the power unit. This method ensures penetration and even depth of work in hard ground and makes the outfit more easily manoeuvrable than a tractor with trailed plough. Whereas one acre takes a man and two horses a day, between four and five acres a day is usual by medium tractor and two-furrow plough.

Plough Monday. In England, the Monday after Epiphany or Twelfth Day, after which the countryman's labours, symbolised by the plough, are resumed after the Christmas holidays. It was customary on that day, particularly in the N. and E. of England, for the ploughmen, decked with ribbons and sometimes wearing their shirts outside, to yoke themselves to a plough and drag it from door to door, begging plough money. In London a grand court of wardmote is held by the lord mayor at the Guildhall on Plough Monday, followed by a banquet.

Plovdiv. City of Bulgaria. Formerly known to Europeans as Philippopolis, it was so named after Philip of Macedon. Situated on the navigable Maritza, it is about 100 m. W.N.W. of Edirne (Adrianople) on the Sofia-Istanbul rly. The seat of a Greek archbishop and of Bulgarian and R.C. bishops, it contains fine churches and mosques. There is a court of appeal. A trading centre, the city makes silks, woollens, leather goods, and tobacco, exporting also grain, rice, and wine. In Roman times it was the chief town of Thrace; under the Turks it was capital of the

prov. of E. Rumelia. An earthquake brought disaster in 1818. The rly. yards were heavily bombed by the R.A.F. during the Second Great War on March 18 and April 17 and 19, 1944. Plovdiv, with a pop. of 99,883, second largest city in Bulgaria, gives its name to an administrative div. with an area of 6,115 sq. m. and pop. 801,755.

Plover. Name given to a large family of shore birds (Charadriidae), including the plovers proper, stilts, oyster-catchers, curlews, sandpipers, godwits, snipe, and others. Numerous species occur in Great Britain. The golden plover (*Pluvialis apricaria*) has



Plover. Hen of the Kentish plover, *Leucopollus alexandrinus*

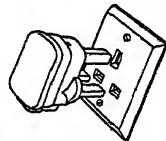
greyish-black plumage spotted with yellow on the upper parts, and black below, and is about 11 ins. long. It is not common, especially in the S. counties, but it breeds in many localities in the N., nesting on the ground among the heather. As it is highly esteemed for the table it is given little chance of increasing in numbers.

The grey plover (*Squatarola squatarola*) closely resembles it in size and appearance, but is without yellow spots. It no longer breeds in Great Britain, but is found near the shore as a winter migrant. The Kentish plover (*Leucopollus alexandrinus*) is small and pale in colour, with black and white head, and occurs in summer along the coasts from Sussex to Yorkshire. The ringed plover (*Chadrius hiaticula*) is distinguished by its black and white collar, and is nearly eight ins. long. Around the coasts it feeds upon small crustaceans, nesting in the sand or shingle a little above high-water mark. The green plover is very common, and is better known as the peewit or lapwing (*q.v.*) See Dotterel; Egg colour plate.

Plug. Material fitted into a hole made in a wall, etc., for holding a screw. This screw or

nail holds in turn a fitting in wood, metal, or other material; alternatively a picture or mirror may hang from a small fitting fixed into a plug. Formerly plugs were of wood. It was thought by many that large plugs, having greater holding area, also had stronger grip, but this theory was disproved by the introduction of an ingenious patent fibre plug which is cylindrical and hollow, and is made in various sizes to suit the gauge of screw used. The plugging process is as follows: the hole is hammered into the wall with the patent bit and bit holder supplied with the plugs, the bit being revolved slightly after each stroke; the plug is then tapped in; and the screw is entered, the effect being to swell the plug, and compress it into the fabric of the wall. Great holding power results.

Plug. Apparatus used by the electrical engineer for speedy connexion or disconnexion of a portable appliance or instrument to or from a fixed set of electrical contacts. The plug consists of a number of brass pins of round, square, or oblong cross-section fitted to an insulated base and cover, with terminals for the connexion of a multi-cored flexible lead. The socket outlet into which the plug fits has circular or flat contacts. Three-pin plugs are largely used, the third conducting to earth. Standard sizes are 2 and 5 amperes for lighting circuits; 15 amperes for electric heating circuits. An all-purpose fused plug and socket of 13 amperes maximum capacity is also standardised. Socket outlets are sometimes combined with a switch and over the live contacts have shutters which close when the plug is withdrawn.



Plug. A three-pin electric plug

Plum (*Prunus*). Fruit-bearing trees of the family Rosaceae. The genus includes damson, greengage, bullace, sloe. The ordinary plum (*Prunus domestica*), though found wild, is not a native of the U.K.; it usually forms the stock upon which are grafted the choicer varieties, of which there are now in cultivation close upon 200. The plum flourishes in a fairly light soil, with a mixture of lime for preference. The more highly cultivated sorts like shelter, and are best grown as bushes, espaliers, fans, or cordons against walls.

They are propagated by grafting in spring or by layering in autumn. In dry seasons the soil round the stems of the trees should be mulched with manure, as the plum is a shallow-rooting subject. Standard plum trees should be planted 15–20 ft. apart; espaliers 12 ft. apart. Standard trees need only sufficient pruning to keep the centre of the tree open, in order to admit light, air, and sunshine. On walls the pruning necessary to keep trees in shape will be found ample for all needs. *See* Bladder Plum; Damson; Fruit; Greengage; Sloe.

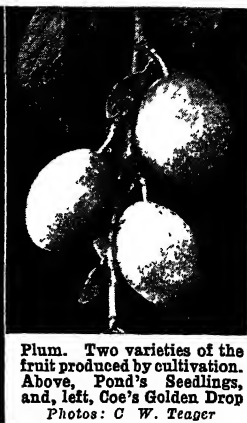
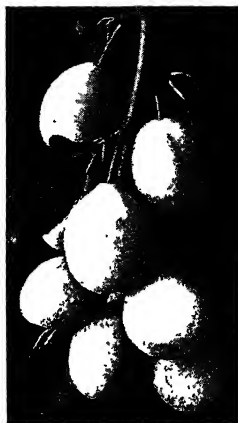
Plumage. Collective term for the feathers with which birds are clothed. The plumage of young birds differs from that of adults of the same species, and after they have reached maturity they are subject to periodical moultings, in some species once, in others twice a year. The Importation of Plumage (Prohibition) Act, 1921, forbids the importation of plumage of most birds. Exceptions are jays, magpies, ostriches. *See* Birds colour plate; Feather; Protective Colouring, colour plate.

Plumbaginaceae OR **PLUMBAGO FAMILY.** Family of herbs and a few shrubs, natives of all regions. They have regular flowers, with a tubular, five-lobed calyx, and five petals with long claws which are usually united to form a tube. There are about 300 species in ten genera, which include the familiar sea pinks (*Armeria*) and sea lavenders (*Statice*).

Plumbago (*Plumbago capensis*). Climbing or trailing shrub of the above family Plumbaginaceae, native of S. Africa. It has alternate, oblong leaves, and short spikes of pale blue, salver-shaped flowers.

P. rosea, from the East Indies, has an erect stem, branching above, and long spikes of rosy-scarlet flowers. The Chinese plant called Lady Larpent's plumbago (*Ceratostigma plumbaginoides*) belongs to an allied genus.

Plumbago. Alternative name for the mineral form of carbon more commonly known as graphite (*q.v.*). It is widely used for the manufacture of refractory crucibles in metallurgy. Owing to its lack of plasticity, it is mixed with 50 p.c. of refractory clay. After moulding, the crucibles are dried and then burnt in kilns, but they tend to pick up moisture and



Plum. Two varieties of the fruit produced by cultivation. Above, Pond's Seedlings, and, left, Coe's Golden Drop
Photos: C. W. Teager

should be slowly heated to a red heat before use. The amount of water absorbed can be considerably reduced by applying a waterproof glaze. The crucibles withstand rapid and repeated changes in temp. without cracking.

Plumber (*Lat. plumbum*, lead). Term for a worker in lead, but now used for any workman who is concerned with the fixing and mending of pipes, etc., used for water supply, and sanitary fixtures of a building. A plumber's work also consists in protecting roofs with sheet lead, the fixing of water gutters and other rain-water conductors, pipes, and their connexions. The term plumber is occasionally used for workmen who fit any kind of piping. *See* Plumbing.

Plumbers' Company, THE. London city livery company. Its records date from about 1365, but it was first incorporated in 1611. The hall in Chequer Yard, Dowgate Hill, rebuilt 1830, was removed in 1865, and the site is covered by Cannon Street rly. station. In recent years the company has done much to promote the technical education and registration of plumbers. The office is at Temple House, Temple Avenue, E.C.4. *Consult* The Plumbers' Company in Ancient and Modern Times, 1902.

Plumbing (*Lat. plumbum*, lead). Working with lead. Plumbing is a very ancient trade, recognized even in Roman times as liable to injure the health

(Vitruvius, Bk. viii, cap. 6, "deep Plumbers' Co. arms



palor," of plumbers). Strictly it should include only actual lead work, such as structural shaping and laying of sheet lead coverings on roofs; making flashings to render joints waterproof, *e.g.* between chimney stacks and roof covering or the valley junctions of two roof slopes; making and fixing lead gutters and lead pipes. But the

term has come to connote not only lead work but also the installation and maintenance of all water and drainage pipes and fittings in buildings.

Plumbing formerly involved beating out lead from "pigs" or ingots into the shapes required, or a sheet. Now it is sold in machine-rolled sheets, and in seamless pipes extruded from a press. In structural plumbing sheet lead is cut and beaten to shape to fit the place to be covered, and secured in place by tacks or screws. Contiguous sheets are joined by "burning" with a blow lamp or lead burning machine, or soldered with a suitable soldering iron. The solder is usually a mixture of tin and lead, and a flux may be necessary to make it flow and adhere. Solder can be bought made up with the necessary flux, so that nothing but heat is required to make it flow on to and attach itself to the parts to be treated, which must be clean.

Sanitary plumbing may still, and often does, involve the use of lead pipe, but it is now possible to form a complete sanitary installation without the use of lead. Details of each system must conform to the regulations of the local authority, though in general plan all installations are similar.

WATER SUPPLIES IN BUILDINGS. The water supply system consists essentially of an incoming supply pipe, which can be isolated from the main by a valve or stop-cock. The pipe should be protected against frost. A supply pipe connected to a public main may at times bring in water at a temp. so much below that of the air inside the building that moisture will condense from the air on to the pipe in sufficient quantity to drip off. This can be prevented

by coating the pipe with a protective sweat-preventing paint or by any suitable thin lagging, two or three thicknesses of newspaper usually being enough to slow down the rate of heat exchange between the pipe and the air to such a rate that condensation will not take place. The supply pipe may be connected to the cold water flow pipes and taps direct, or it may deliver into a storage tank or cistern through a ball valve which will stop the inflow before the tank overflows. If this arrangement is adopted some local authorities insist on the provision of a tap to deliver drinking water on the pipe supplying the tank. This is necessary only if the storage tank is not properly covered and protected from contamination.

The hot-water system must be fed through a ball-valve controlled cistern, and must contain a hot-water storage tank, usually called a cylinder, because it is generally convenient to use a cylindrically shaped tank. As a rule the pipe from the cistern is led to the bottom of the cylinder, from which a pipe called the return pipe is led to the boiler. The flow pipe leads from the boiler to the top of the cylinder. The flow and return pipes must be so arranged that as the water becomes hot and lighter it will rise and let the heavier cold water follow it into the boiler, setting up a steady circulation through the system. An expansion pipe must be led up from the top of the cylinder to above the water level of the storage tank, to permit the escape of air driven out of the water, or of steam if any is formed. The delivery pipes to the taps may be taken off the flow pipe before it enters the cylinder, but are more usually taken off the top of the cylinder, which enables the user to draw hot so long as there is any in the cylinder.

Central heating by hot water (described under Heating) is also the concern of the plumber in the contemporary meaning of the term; its design and installation requires theoretical knowledge as well as practical experience.

HOUSE DRAINAGE. The essential feature of a good drainage installation is the rapid removal outside and away from the building of all dirty water in such a way that no nuisance can arise from the presence of foul gases. The discharge from water-closets and from kitchen sinks is taken in a continuous pipe, usually 4 ins. in diameter and called the soil

pipe, from the fitting to the house sewer. Some British local authorities allow bath and wash-basin water into the soil pipes, others insist on a separate down pipe for them, which may be 3 ins. in diam. delivering into the house sewer through a back entry gully trap. When a separate pipe is used, it is common to cut off, in the air above the head of the down-pipe, the actual discharge pipe from the fitting.

All fittings must be provided with a waterseal to prevent any gas from passing back from the system into the house. Even when a discharge pipe is cut off in the air above a down pipe, a water seal should be inserted in the discharge pipe, for even a short length of unsealed pipe can give rise to odours, chiefly derived from the decomposition of soap, which, though generally harmless, are yet extremely unpleasant.

In the U.K. water-closet fittings must conform to local by-laws. The essentials are a flushing cistern capable of discharging its whole contents, $2\frac{1}{2}$ to 3 gals., at one pull of the operating chain or lever, and refilling quickly, and a bowl of non-absorbent material of such a shape as to hold sufficient water for the excreta to fall into it free of the sides of the pan, and also of such a shape that when the flush is operated the whole contents of the pan will be swept out. The bowl must discharge into the house sewer through a trap or water seal which is usually a pipe formed in the shape of a capital P, or a capital S, laid on its side, in which water will always be left standing high enough in the dip to leave no passage for air over its surface. Where water-closets discharge into one soil pipe, an air pipe called the antisiphonage pipe must be led up from the discharge pipe of each water-closet just after the seal to a point above the highest water-closet connexion in order to prevent the rush of water down the soil pipe from one closet acting as a vacuum pump and sucking the water out of the seal of another. The anti-siphonage pipe can be taken itself above roof level, or connected into the soil pipe above the connexion to the highest water-closet. To ensure efficient ventilation the soil pipe must extend backwards from the water-closet junction to a point above all windows, and preferably above roof level. The entry of foreign bodies should be prevented by a wire mesh cap.

The house sewer, usually 4 ins. diam. and laid if possible on a

gradient of 1 in 40, leads to the nearest public sewer or, where there is no public sewer within reasonable distance, may terminate in a cess pit or cesspool (*q.v.*).

PIPES AND FITTINGS. Formerly all the pipes used in a building were made of lead. From c. 1850 cast iron, wrought galvanized iron, or copper has tended to replace lead. Down pipes for rain water and 'soil pipes for sewage are nearly always made of cast iron. The former are usually loose jointed, the spigots resting in the sockets; the former are joined with yarn and lead caulking or, occasionally, cement. Water supply pipes are usually galvanized wrought iron tubes, screwed into sockets, in all the straightforward lengths, taken round corners or divided into branches by screw-socketed or screw-spigoted special shapes. It is common to use short lengths of lead pipe to connect them to the fittings, partly because it is easier to shape lead pipe to suit each place than to bend iron pipe, and partly because there is much less danger that lead pipe will put a strain on the earthenware of wash-basins, etc., which might crack it. The junction between lead-pipe and galvanized pipe, and between lead pipe and taps and fittings, and even between two lead pipes, is usually by a "wiped" or "soldered" joint, effected by pouring molten solder on the joint and "wiping" it to shape by a hand encased in a thick, well-greased glove. Copper pipes are made with specially prepared spigots and sockets which need only to be fitted into one another and heated, with a blow lamp, to form a braised joint. Lead and cast-iron pipes and even galvanized iron pipes in course of time are liable to corrosion by soft, slightly acid waters. Copper pipes are free from this disadvantage.

Whatever pipe system is installed, stopcocks should be inserted which will make it possible to isolate parts of the system while effecting minor repairs, such as renewing tap washers, without shutting down the whole. See Drainage; Sanitation; Sewerage.

F. C. Temple, M.Inst.C.E.

Plumb Level. Device used for maintaining a vertical surface. It consists of a narrow length of wood having parallel edges and a straight line scored down the centre from the top to a hole cut to receive the weight of a plumb line (*v.i.*). The line is secured in notches at the top of the wood, and when

the length of wood is vertical the line lies in a groove. Some plumb levels have a spirit level in the top.

Plumb Line. Device used by builders to determine the verticality of a surface. A length of cord has at one end a cone-shaped plummet of brass or lead. When fixed or held by its free end, the plumb line adopts a position so that the point of the weight is directed to the centre of gravity of the earth. If the object being tested is not truly vertical, the space between the plumb line and the object will taper towards the top or bottom.

Plume Bird. Name sometimes applied to the genus *Epimachus*. See Bird of Paradise.

Plume Moths. Small, elegantly shaped moths belonging to two families. The wings are cleft into narrow plume-like divisions fringed with hairs along their margins. In the family *Pterophoridae* the forewings are longitudinally cleft into two or, more rarely, three or four divisions, and the hind wings into three. Some 32 species are British. In the *Orneodidae* family both pairs of wings are cleft into six or more divisions; only one species is British.

Plumer, HERBERT CHARLES ONSLOW PLUMER, 1ST VISCOUNT (1857-1932). British soldier. Born March 13, 1857, he went from Eton to a commission in the York and Lancaster Regiment in 1876. He served in the Sudan, 1884, and in 1896 as a major raised and com-



Lord Plumer, British soldier

manded a mounted force during the Matabele rising. After service in the S. African War he became a major-general. He was made quartermaster-general, with a seat on the army council, 1904, and during 1911-14 commanded the northern district. In 1906 he was knighted.



Plumb level and line

In Jan., 1915, Plumer was sent to France to lead the 5th corps, and in May assumed command of the 2nd army. The great British attack on Messines (*q.v.*), which Plumer directed in 1917, was regarded as one of the best planned and executed operations of the First Great War. From Nov., 1917, to March, 1918, he was G.O.C. of the expeditionary force to Italy, and then returned to the 2nd army. In 1919 he was made a field-marshal and a baron. Governor of Malta, 1920-24, and high commissioner for Palestine, 1925-28, raised to a viscounty in 1929, and died July 16, 1932. The 2nd viscount died, Feb. 24, 1944, leaving no heir. *Consult* Plumer of Messines, C. Harrington, 1935.

Plumpton. Village of Sussex, England. It is 44 m. S. of London and is served by rly. The church is mainly Early English, and there is a racecourse at which meetings are held from Sept. to May. Pop. 764. There is also a Plumpton in the W. Riding of Yorkshire 2 m. from Knaresborough.

Plum Pudding. National Christmas dish in England. It is composed of raisins, sultanas, currants, lemons, chopped apples, candied peel, sugar, breadcrumbs, flour, suet, salt, spice, and eggs. These mixed materials are generally, though not necessarily, moistened with beer or stout and brandy. The quality of the pudding largely depends on the stirring and mixing. When ready it is either put into a pudding basin with a cloth tied tightly over it, or boiled in a cloth. In either case the time of boiling should be from six to eight hours. In Elizabethan times neither cloth nor basin was used, and the dish from which the Christmas pudding has evolved was known as plum porridge.

Plumstead. London district. Part of the met. bor. of Woolwich, it is in Kent, 10½ m. by rly. E. of Charing Cross, and is served by tram and bus. The church of S. Nicholas, with early 17th century square tower, was displaced in 1864 as the parish church by S. Margaret's, built 1858. In High Street are public baths, public library, opened 1904, and S. Nicholas hospital. In addition to the marshes, the open spaces include Plumstead Common, Bostall Heath, acquired for the public in 1877-78, and Bostall Woods, acquired in 1892, in all nearly 134 acres. Woolwich Arsenal football ground was once in the dist. Plumstead was heavily bombed in 1940 and 1944. Pop. est. 50,000.

Plumstead manor was given by King Edgar in 960 to the abbot and monks of S. Augustine's, Canterbury, and in the 18th century passed to Queen's College, Oxford. The marsh was walled by the monks of Lesnes or Lessness Abbey, but after 1527 its 2,000 acres lay under water for 36 years, until the work of reclamation was begun in 1563 by Giacomo Aconzio; part is used for gun-testing.

Plunket, WILLIAM CONYNNGHAM PLUNKET, 1ST BARON (1764-1854). Irish lawyer and politician. Born



Plunket

at Enniskillen, July 1, 1764, he studied law at Dublin university and Lincoln's Inn, London, and was called to the Irish bar in 1787. Plunket entered the Irish parliament in 1798 in the Whig interest, and strongly opposed the Union. He was Irish attorney-general, 1805-07, and again in 1812. He first sat in the British parliament in 1807, as a champion of Catholic Emancipation. From 1812 to 1827, with one short interval, he represented Dublin university, and then was appointed chief justice of the common pleas, entering the house of lords as Baron Plunket. In 1830 he was made lord chancellor of Ireland, retaining the office until 1841. He died Jan. 5, 1854.

Plunket, WILLIAM CONYNNGHAM PLUNKET, 4TH BARON (1828-97). Irish prelate. A son of the 3rd Baron Plunket, he was born in Dublin, Aug. 26, 1828. Educated at Cheltenham and Trinity College, Dublin, he was ordained in 1857. In 1869 he became precentor of S. Patrick's cathedral, Dublin; in 1876 was consecrated bishop of Meath; and from 1884 to 1897 was archbishop of Dublin. A leader among evangelicals, he took a prominent part in resisting disestablishment and afterwards in directing the Church on its altered career. He succeeded to the title in 1871 and died April 1, 1897.

The 7th baron, Patrick (b. Sept. 8, 1923), succeeded his father in the peerage in 1938.

Plunkett, SIR HORACE CURZON (1854-1932). Irish statesman. Third son of the 16th Baron Dunsany, he was born Oct. 24, 1854, and after passing through Eton and University College, Oxford, made a fortune as a cattle-rancher in Montana, 1879-89. A strong sup-

porter of cooperative methods in agriculture, he founded the Irish Agricultural Organization Society in 1894. He sat as Unionist member for Dublin co. S., 1892-1900; acted as chairman of the Irish Convention, 1917-18; was a senator of the Irish Free State, 1922-23; and died March 26, 1932. Among his writings are Ireland in the New Century, 1904; A Better Way, 1914; Home Rule and Conscription, 1918.

Pluralism. Practice of holding more than one ecclesiastical benefice at the same time. The abuse of pluralities arose early in the history of the Church, for it was forbidden by the council of Chalcedon, 451, and again by the second council of Nicaea, 787. It was forbidden in England by Act of parliament in 1529, but during the Georgian period it revived to a scandalous extent. Acts of 1838 and 1885 made pluralities illegal, except in respect of very small livings with few parishioners, in which case the archbishop can grant a dispensation, if he thinks fit, for a clergyman to hold two livings, providing that the churches are within four miles of each other, and that the annual value of one of the livings does not exceed £400. See Benefice; Ecclesiastical Law.

Plural Voting. Name given to an electoral system that allows a man to have more than one vote at the same election. In the U.K. a person might be on the register of voters for several constituencies, e.g. in one as a resident, in others as an occupier of business premises, or as a university graduate. After 1918 he could exercise only two votes, one in respect of residence and another of any other qualification. An Act of 1948 abolished all forms of plural voting, including the university franchise.

Plus Fours. Article of male attire. A form of baggy knickerbockers, originally worn when playing golf, the dress became popular between the Great Wars. The name is believed to have originated during the First Great War, when Guards officers wore wide trousers and puttees with khaki service



Plus Fours as worn by a golfer



Pluto. Statue of Pluto and Persephone by Bernini
Borghese Museum, Rome

dress; regulations required the trousers to hang over the tops of the puttees, plus four inches below the knee. Another suggestion is that the term was derived from the largest official golf handicap, plus four.

Plush (Fr. *peluche*, from Lat. *plius*, hair). Fabric with a pile longer and more open than velvet. It is used for cloaks and upholstery. Plushes have a pile normally of silken mohair. Hatter's plush, used to make men's silk hats, is a special variety.

Plutarch (c. 48-122). Greek biographer and philosopher. He was born at Chaeronea, and appears to have spent a considerable time in Rome, where he lectured on philosophy and enjoyed the favour of Trajan and Hadrian, but his declining years were passed in his native town. Plutarch's fame rests almost entirely on his *Parallel Lives*, a collection of 46 biographies of notable men, nearly all in pairs, one Greek, the other Roman—e.g. Alexander the Great and Julius Caesar. The resemblance between the pairs is often slight. They are of great historical interest, much of the matter being based on authorities now lost, and much historically inaccurate. Shakespeare drew upon Plutarch through North's translation for his classical plots. Plutarch was also the author of numerous essays on a wide variety of subjects, grouped under the general title *Moralia*.

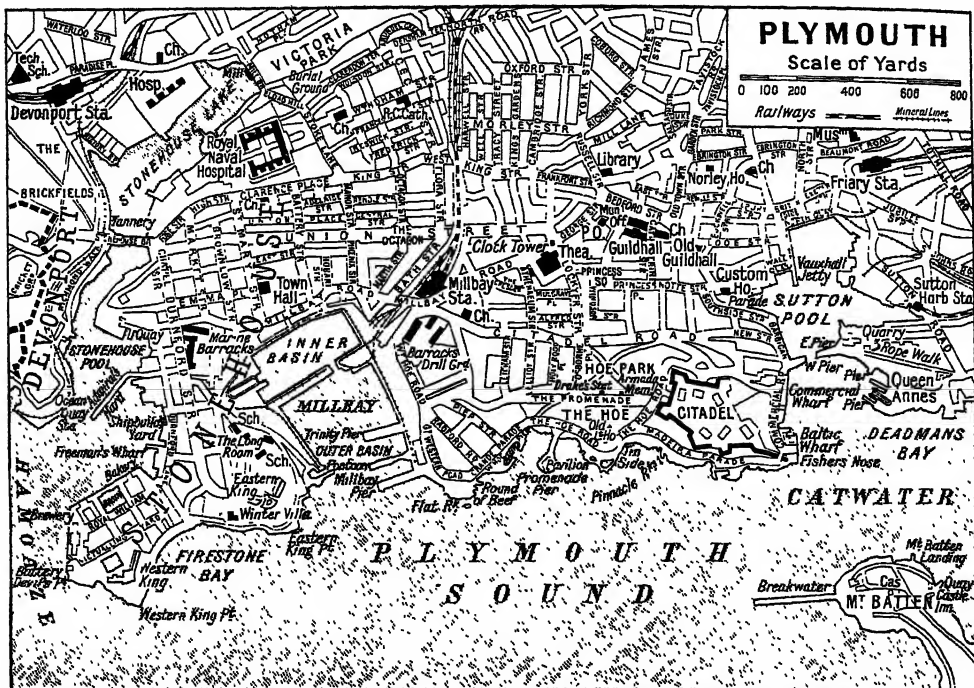
Bibliography. Translations of the *Lives* by Sir T. North, 1579; J. W. Langhorne, 1770; B. Perrin, 1914; *Roman Lives*, G. Long, 1844-47; Popular Introduction to Plutarch, R. C. Trench, 1873; The Religion of Plutarch, J. Oakesmith, 1902.

Pluto (Gr. *Ploutōn*). Roman name for the god of the lower regions, more commonly known to the Greeks as Hades. He is regarded as (1) the stern and relentless ruler of the horrible underworld; (2) a beneficent chthonian deity, who distributes to mankind the products of the earth, both mineral and grain. His wife was Persephonē, whom he carried off while she was gathering flowers at Enna in Sicily. He is not to be confused with Plutus, the god of wealth, although etymologically they are identical. See Hades; Persephonē; Tartarus.

Pluto. Planet, ninth in order from the sun, discovered photographically by Tombaugh at the Flagstaff observatory in 1930. Calculations by Lowell in 1915 had predicted, with a degree of uncertainty, the position of a planet beyond Neptune, having a disturbing influence on Uranus. After examination of over half a million star images, an object of the 15th magnitude moving at about the predicted speed, was discovered on Jan. 23, 1930. The actual orbit of Pluto is much closer to that predicted than the accuracy of the observations warrants, and to that extent the discovery was by chance; but without Lowell's work the search would probably not have been made.

The period of Pluto is 248.4 years and its mean distance from the sun 3,675 million m. The eccentricity of its orbit is so great that the planet actually comes within Neptune's orbit when it is closest to the sun. It is too small to be seen as a disk in the biggest telescopes, and therefore little is known for certain of its physical characteristics.

Pluto, OPERATION. Code name for Pipe Line Under The Ocean, the petrol supply pipes laid across the bed of the English Channel to supply the Allied armies which invaded the Continent in 1944. The pipes were of two types: one resembling a submarine electric power cable without the cores, 3 ins. in diameter and armoured to withstand working pressures up to 1,300 lb. per sq. in., was made in 70-m. lengths; the other was a 3-in. diameter steel pipe welded into continuous lengths of 30 m., and had the code name Hamel. The pipes were flexible and wound on large floating drums. As the drums were towed by a tug the pipe was unwound and sunk to the seabed. Pluto was connected to the 1,000-m. network.



Plymouth, Devon. Plan of the city, and the docks and shipbuilding yards at Devonport, before the devastation of 1940-44

of oil pipe lines laid across England early in the Second Great War to link ports with the internal distributing centre. High-pressure pumping stations on the S. coast forced the oil through the under-water pipes, which at the height of the campaign in Europe were carrying 3,000,000 gallons a day.

Pluto Monkey (*Cercopithecus pluto*). Species of guenon monkey, better known as the black-bellied monkey. It occurs in Central Africa, and the general colour of its hair is black, grizzled on the head and back. It is conspicuous for its bushy whiskers.

Plutonic Rocks. In geology, name given to those igneous rocks which have consolidated at considerable depths below the surface of the earth, and have been brought to the surface by various agencies. They are distinguished from the volcanic rocks formed near the surface. Granites are plutonic rocks. See *Igneous Rocks*.

Plutonium. Radio-active element, at. no. 94, first discovered in 1940 as a product of the bombardment of uranium 238 with deuterons, and isolated in 1942 as plutonium 238. Very much larger quantities of another isotope (plutonium 239) were obtained from the bombardment of uranium 238 with slow neutrons in atomic

piles. Evidence has since been found for the occurrence of very small traces in natural uranium deposits. Plutonium 238 and 239 emit α -rays, with half-lives of 50 and 24,110 years respectively; plutonium 241 (from the bombardment of uranium 238 with helium nuclei) emits β -rays. All forms undergo fission on bombardment with neutrons over a wide range of energies, so that a chain reaction as with uranium 235 is possible; plutonium therefore provided an alternative material for atomic bombs. A plutonium pile for the controlled production of atomic energy was set up at Los Alamos, N.M., in 1946.

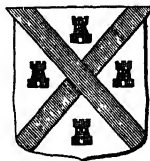
Pluviôse. The fifth month in the year in the calendar of the French Revolution. It began on Jan. 20 or 21 and lasted 30 days. The word means the month of rain.

Plymouth. City and co. bor. of Devon, England. Since 1914 it has included Devonport and Stonehouse, being popularly known as "The Three Towns." It is situated at the mouth of the Plym at the head of Plymouth Sound, one of the deep and commodious estuaries formed by the submergence of a river valley characteristic of S.W. England. It is served by British Rlys. (W. Region) and has extensive docks;

within the breakwater a large number of ships can find safe anchorage in Sutton Pool, Millbay, the Catwater, the Hamoaze, in readiness to enter the floating basin, graving docks, or to reach the dock wharves.

Plymouth is a mail station for fast traffic from overseas to London, and is one of the chief fishery stations on the S. coast. The naval station is at Devonport. Plymouth Hoe is a ridge between Millbay and Sutton Pool; it is the property of the town council, and on it are a fine statue of Sir Francis Drake, and part of the old Eddystone Lighthouse as a monument to Smeaton. On the Hoe, too, is the Citadel and a memorial to men of the Royal Navy who fell in the First Great War.

Plymouth was the first town in England incorporated by act of parliament, Nov. 12, 1439. During the mayoralty of Sir Francis Drake in 1585 were constructed the municipal waterworks, reputedly the oldest in England. Called by the Saxons Tamarworth, and Sutton by the Domesday chroniclers, the town became Plymouth



Plymouth arms



in the reign of Henry VI. From the port sailed the Black Prince for France and the victory at Crecy; Drake, Hawkins, and Cook on their celebrated voyages. Hence sailed the Mayflower in 1620. From 1642 to 1646 the town was frequently and desperately attacked by the Royalists. In 1688 Plymouth early supported William of Orange, in whose reign the building of the dockyard was begun.

Plymouth is the seat of an R.C. bishopric, founded 1851. It formerly elected three M.P.s, but this number was reduced to two in 1950. Lady Astor (*q.v.*), the first woman to sit in the house of commons, was returned for Sutton division of Plymouth in 1919.

The city was severely damaged by air raids, March and April, 1941, when much of the central area was totally destroyed. Among the important buildings which then disappeared were the Guildhall and other municipal offices, and S. Andrew's church, while the Barbican, whence the Pilgrim Fathers sailed, was much damaged. Sir P. Abercrombie, in conjunction with J. P. Watson, the city engineer, prepared a plan for rebuilding the city centre, and the work began at the end of the Second Great War. The new main E.-W. and N.-S. roads (Royal Parade and Armada Way) were formally named by King George VI in 1947.

Plymouth was one of the concentration and embarkation points for the allied armies invading Europe in 1944. Pop. 220,800.



Plymouth, Devon. The Hoe, with the old Eddystone lighthouse, seen from the fort. Top, site of the busy city centre, devastated by German bombs during the Second Great War

disembarked is marked by Plymouth Rock, a granite boulder, now covered by a fine granite canopy. Other objects associated with the Mayflower Pilgrims are a national monument, 1858-88, and Pilgrim Hall, which houses a collection of relics. For 300 years the town kept its character as a stronghold of Puritanism; up to 1840 Christmas was not observed as a festival. Pop. 13,100. See Pilgrim Fathers.

Plymouth, Borough of Pennsylvania, U.S.A., in Luzerne co. It stands on the Susquehanna river, 4 m. N.W. of Wilkes Barre and is served by rly. It lies in a valuable anthracite region, and its chief industries are associated with the working of coal. Mining tunnels have caused houses to cave in. Plymouth was settled in 1768 and incorporated as a borough in 1866. Pop. 15,507.

Plymouth, Chief town and capital of Montserrat, Leeward Islands. It lies on the W. coast and trades in cotton, limes, tomatoes, and onions. Pop. 1,893.

Plymouth Brethren. Protestant sect, which arose about

Plymouth. Town and port of entry to Massachusetts, U.S.A., the co. seat of Plymouth co. It stands on Plymouth Harbour, a branch of Massachusetts Bay, 36 m. S.E. of Boston. It was the landing place of the Pilgrim Fathers in 1620, and the spot at which they

1830 in Plymouth and Dublin. One of its chief founders was John Nelson Darby (*q.v.*), after whom the Brethren were formerly called Darbyites. He gave up his position in the Church and travelled about the country, forming small societies of Evangelical Christians for Bible study and the promotion of spiritual life. These gradually formed small congregations, which met in houses and halls for worship. The Plymouth Brethren, numbering about 80,000, have no organic unity and no creed. In doctrine they are Calvinistic; they usually baptize by immersion; and observe the "breaking of bread" every Sunday. They object to any fixed ministry.

Plymouth China. Variety of chinaware. It is a hard paste biscuit ware, in which kaolin and flintstone are used, dipped in glaze, and fired at a high temperature. It was manufactured at Plymouth by William Cookworthy, 1768-74. The table services, salt cellars, and centre pieces generally bear rock-work and shell decoration. See colour plate facing p. 2041 and China Marks illus. p. 2043.

Plymouth Rock. Popular "utility" breed of fowls, originating in the U.S.A. from crossing a Black Java hen with a Grey Dominique cock. Robust, hardy birds, their blue-grey plumage is uniformly barred with black; the bill, legs, and feet are yellow, and the single comb is upright. Cocks weigh 10 or 11 lb., hens 2 lb. less.



Plymouth, Massachusetts. The old burying ground in which are buried some of the Pilgrim Fathers

Their eggs are large and brown. The chickens soon make good table birds. See Fowl colour plate.

Plymouth Sound. Deep inlet of the English Channel, between Cornwall and Devon. Into it flow the river Tamar from the W., and the river Plym from the E. The estuary of the Tamar, known as the Hamoaze, is 4 m. long by $\frac{1}{2}$ m. wide, and is the chief anchorage for war vessels in Plymouth Harbour; while the estuary of the Plym, called the Catwater, is a

capacious anchorage for mercantile vessels. The sound is protected by a breakwater nearly 1 m. long.

Plympton. Market town of Devon, England. It is 5 m. E. of Plymouth, on the Plym, and consists of two adjacent places, Plympton St. Mary and Plympton St. Maurice, or Plympton Erle. It has a rly. station. The buildings include a fine old church, and a grammar school at which Sir Joshua Reynolds, born here, was educated. Plympton had a castle and an Augustinian priory. It was made a borough in the 13th century, and from 1295 to 1832 sent members to parliament. One of the stannary towns, it had fairs and markets. Its privileges as a borough were taken away in 1859. Population 9,000.

Plymlimon OR **PLYNLEIMON.** Mountain of Wales. It stands on the borders of Cardiganshire and



Plymlimon, Wales. A distant view of this triple-peaked mountain

Montgomeryshire, and has three summits, the highest being 2,465 ft. high. The word is said to be a corruption of a Celtic term for five rivers, as five rivers rise hereon—Wye, Severn, Rheidol, Ystwyth, and Llynfiant. On and around the mountain are a number of bogs.

Plywood. Name given to sheets of wood of various thicknesses built up of thin layers. The layers (plies) are glued together; the grain of each ply is arranged at right angles to that of the ply on either side of it. Plywood cannot shrink, has great strength, and may be very wide; the material has therefore revolutionised most of the industries in which wood is used, and is almost as important as ordinary timber.

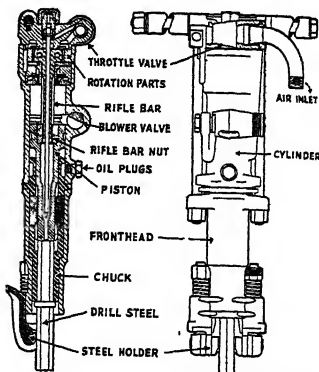
Three-ply is made in thickness from less than $\frac{1}{8}$ in. to about $\frac{1}{2}$ in. Multi-ply is plywood with more than three laminations, the number always being odd. In block-board, two outer layers have between them a core of narrow strips cemented side by side and placed the opposite way of grain to the outer sheets. Lamin-board is made on the same principle but is of superior quality. The plies of plywood are either produced by

the rotary system, in which the log is placed in a special lathe, the leaf being peeled off until the core of the log is about the size of a large domestic mangle roller; or cut off the flat of the log and jointed. See Joinery; Timber.

Pneumatic Appliances. Class of machine or instrument in which compressed air is the main source of power. Compressed air can be conveniently stored and is conveyed by pipes to the point of use. It requires no insulation against heat loss in transmission, involves neither fire nor shock hazard, and is flexible, compact, and powerful. It has a wide variety of uses; hundreds of specific applications of compressed air could be mentioned and the list would still be incomplete.

AIR COMPRESSORS. Air is compressed from atmospheric pressure (zero gauge pressure) to a

this class of compressor can be arranged so that air is drawn in and compressed on one side of the

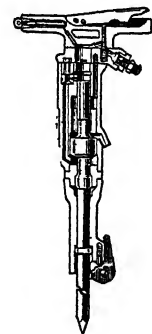


Pneumatic Appliances. Hand-held rock drill, weighing 30-60 lb. which drills holes 2 or 3 ins. in diam. in rock to depths of 20-30 ft.

piston or on both sides (respectively single-acting and double-acting). When the final pressure is reached in one cylinder this is known as single-stage compression. Where the air is partially compressed in one cylinder and then passed on to one or more subsequent cylinders in each of which it is compressed to a higher pressure, this is multi-stage compression. There can be two stages, three stages, four stages, etc., depending on the final working pressure required. Compressing by stages and cooling the air between compressions result in lower maximum temps., reduction in power required, and an increase in the amount of air actually delivered by the compressor. The saving in h.p. as between single-stage and two-stage compression for a discharge pressure of 100 lb. per sq. in. gauge is about 15 p.c., and there is a further saving of about 5 p.c. if three-stage compression is used. A two-stage compressor is normally used for 100 lb. discharge pressure except on machines of small capacity where the saving in power would not compensate for the greater first cost.

Air compressors can be driven by electric motor, steam engine, water wheel, or, on portable units used on the roads to drive concrete breakers, diesel—or petrol—engine.

PNEUMATIC HAMMERS. In a large number of hand-held tools and other machines compressed air is made to move a piston or hammer backwards and forwards in a cylinder, the piston exerting a blow at the end of one of its strokes on the striking end of a



Pneumatic Appliances. Section of a concrete breaker, showing trigger-controlled air inlet-valve, piston anvil block, and "moll" pointed steel pick

cylinder being provided with air admission and discharge valves;

pick, spade, chisel, rivet set, rock drill steel, or some other similar attachment. The smallest such tool is the carver or stone tool used by stonemasons and sculptors. Other small tools are the pneumatic pick, clay digger, chipping and caulking hammers, riveter, and rivet buster (the last used for knocking out old or badly driven rivets). Larger tools are concrete breakers (sometimes called road drills), rock drills, either hand-held (Jackhammer) or the much heavier "drifter" drill mounted on a cradle and carriage and having an air-driven motor feed for advancing the drilling machine as the hole gets deeper. Such machines are used for tunnel driving and in large quarries, the holes being drilled to take explosives.

Air driven tampers for ramming the sand around patterns in foundries, rammers for consolidating loose ground, forging presses and great "steam" hammers striking blows up to 20,000 lb., are all available for use with compressed air. Air-operated



Pneumatic Appliances. 3. Pneumatic circular hand saw, which uses 12 in. circular saws for cutting wood up to 4 ins. in thickness

chucks for holding the work on lathes and other machine tools, which are fast and safe and require only one hand to operate, are virtually standard equipment in machine shops.

PNEUMATIC ROTARY MACHINES. A wide range of air-powered motors either of the piston or air-vane type are used to drive hand-held power drills for drilling holes in wood, coal, and metals and for reaming or tapping threads in metal assemblies. Such tools are to be found in nearly every industry. Air-powered screw-drivers, wrenches, grinders, sanders, and polishers are other examples of common pneumatic tools, as are also direct lift and



Pneumatic Appliances. 4. Wood borer, drilling 3 in. holes in hard wood with air-operated, piston type drill. The rate of drilling is about 8 ins. a minute

pull type hoists from 100 lb. to 10 tons capacity.

OTHER USES OF COMPRESSED AIR. The "air-lift" system of pumping wells and getting water out of flooded mines depends on the fact that a column of water in which air bubbles are introduced at the bottom of the column has a lower density than that of water only. The principle is explained in the entry Air Lift.

The application of paints and other fluids by air spraying is now common; metal spraying also has been introduced into many industries. Rlys. use compressed air to operate automatic signals and moving points, for air-brakes, for opening and closing train doors, and for cleaning carriages and locomotives. Materials such as coal, cement, grain, broken rock, etc., are readily transported through pipes either by compressed air or by air suction. Conveyance of materials through tubes by compressed air has been in use since about the middle of the 19th cent.; perhaps the most common example is the pneumatic dispatch system used in large stores and warehouses for sending cash or messages to and from a central accounts department or office. Consult Handbook of Pneumatic Equipment, issued by the British Compressed Air Society.

D. Y. Marshall

Pneumatolysis (Gr. *pneuma*, vapour; *lyein*, set free). In geology, name given to the formation of minerals produced by the action of volatiles, e.g. steam, with compounds of chlorine, boron, fluorine, carbon dioxide, etc., derived from

masses of igneous rock. The cooling and crystallisation of the igneous intrusion eliminates the molten rock-matter in which the gases were dissolved, and the latter are in consequence driven out. They may soak through the rocks, or travel along planes of weakness, so forming veins. The chemical agents which are active at this stage cause widespread alteration of the pre-existing rocks: feldspars are decomposed. The Cornish china clay deposits were formed by this process. Topaz, tourmaline, axinite, scapolite, etc., and some valuable ore deposits owe their origin to pneumatolytic action. *Pron.* new-ma-tolly-sis.

Pneumogastric. For this anatomical term, see Vagus Nerve.

Pneumokoniosis. The general term given to changes in the lung resulting from the inhalation of dust. These changes consist of a type of fibrosis, which varies according to the type of dust, so that such varieties occur as anthracosis from coal, asbestosis from asbestos, lithosis from stone, siderosis from iron and metallic dusts, and silicosis from silica.

The commonest form is anthracosis, which is found to some degree in all town dwellers, and especially among coal miners. It tends to block the lymph channels of the lung but causes no damage to the lung structure unless the coal dust contains silica. If this is so, silicosis results. If the patient leaves the mine, the disease does not progress; if he continues, the lymph channels can become completely blocked and parts of the lung substance become consolidated. Breathlessness increases and forces the patient to stop work. A dry cough supervenes, and an ever greater tendency to bronchitis. Complications are chronic bronchitis, emphysema, dilatation and infection of bronchial tubes leading to bronchiectasis, heart failure, or pulmonary tuberculosis.

The disease can be prevented by the use of masks, by proper ventilation, and by water sprinklers which prevent the formation of dust. All who are employed in occupations of the kind indicated should have periodic medical examination, including X-rays, of the chest, with a view to change of occupation if the disease has developed.

Pneumonia (Gr. *pneumōn*, lung). Inflammatory disease of the lung substance, which fills the air sacs of the affected part with an exudate. The acute form has two

varieties—lobar or croupous pneumonia and lobular or bronchopneumonia.

Lobar pneumonia attacks one or more lobes of the lung (*q.v.*). It is specific and infective, and is caused by the *streptococcus pneumoniae* or pneumococcus. The disease is most common in temperate climates and in the U.K. it formerly caused more deaths than any other acute disease. It is rare between the ages of six and fifteen; while children usually recovered, the mortality increased steadily after the age of 30, and over 60 it was almost invariably fatal. 70 p.c. of adult cases occur in males. The commonest causative factors are those reducing defence against infection: old age and chronic debilitating diseases, such as pulmonary tuberculosis, cirrhosis, nephritis, diabetes, mental illness, and chronic alcoholism. Cold, exhaustion, and a preceding attack of influenza are predisposing factors in young adults.

There are three stages in the effects of the disease on the lung. The first is a congestion stage, and this is followed by two forms of solidification, red and grey hepatization. Thereafter there is recovery, with absorption of the exudate, or death, which usually occurs within ten days of the onset. The disease usually begins suddenly, often with rigor and a temperature which rises to 103° F. or over on the first day. The high temperature is continuous for a period of from five to nine days, when it falls suddenly at what is known as the "crisis"; at this point the patient's distress gives way to a sudden feeling of comfort. Generally the patient first complains of shivering and intense pain in the side from the pleurisy which accompanies the disease. He has a painful dry cough, very tenacious phlegm, often tinged with blood and giving the typical rusty sputum of pneumonia. He lies on the affected side, breathing rapidly and jerkily and dilating his nostrils. Commonest complications are empyema and pericarditis.

The most important measures for treatment are to ensure abundant fresh air and complete rest. Fluids containing glucose are prescribed, together with light food such as milk, jellies, and fruit juices containing sugar. Morphine may be necessary to ensure ample rest, give relief from pain, and combat delirium. M and B (*q.v.*) is now universally prescribed, and is always advised where the patient has effects of toxæmia. It reduces

the temperature, combats the toxic effects of the disease, and almost invariably brings recovery. It does not remove the exudate, however, and therefore as much time is still required for convalescence as was necessary before its introduction. No patient should be allowed to return to work under at least two months after the temperature has become normal.

Pneumo-thorax. Presence of air in the thoracic cavity, *i.e.* between the lung and the chest wall. The condition may be due to rupture of the lung, so that air finds its way between the layers of the pleura or to an external injury perforating the wall of the chest and allowing ingress of air from the outside. Pneumo-thorax results in a certain degree of collapse of the lung. The condition may be induced artificially in the treatment of phthisis so that the affected lung may be rested.

Pnom Penh or PHNOM-PENH. Capital of Cambodia, Indo-China. It stands on the Mekong, 130 m. N.W. of Saigon. While under French suzerainty, the city was transformed by the construction of fine public buildings and spacious boulevards. Cotton gins and rice mills provide employment. The chief buildings are the palace of the Buddhist priests and the pagoda. The city is a great centre of trade, especially for the district round the Great Lake to the N.W., and there is regular steamer connexion with Saigon. It is the terminus of the Singapore and Bangkok rlys. Population 102,678.

Pnyx. Place of meeting of the ecclesia (*q.v.*) or general assembly of the people of ancient Athens. It was probably in the neighbourhood of the Acropolis and the Areopagus, but the exact identity of the place is doubtful.

Po (anc. *Padus*). River of Italy. It rises in the Cottian Alps (*q.v.*) by Mt. Viso, and flows in an E. direction through Piedmont, Lombardy, and Venetia to the Adriatic, which it enters by several mouths. About 415 m. in length, it is navigable for over three-quarters of its course. The drainage area is about 28,000 sq. m., and the chief tributaries are the two Doras, Sesia, Ticino, Adda, Oglio, Mincio, Tanaro, Trebbia, and Secchia.

The valley is an ancient arm of the Adriatic Sea, which has been gradually silted up with the off-scourings of the Alps and Apennines; the process continues even now, despite the regulating embankments and dikes, for the delta is growing steadily eastwards. In

former times forested and marshy, it has been so altered by man that it is one of the most productive agricultural areas in Europe, the rice crop grown on the irrigated areas yielding 10 million cwt. in a normal year.

Historically the Po valley has been one of the cockpits of Europe. Numerous invading hordes swept into the N.E. across the low saddle of the Carso, conquerors, including Hannibal and Napoleon, entered the N.W. over the Alpine passes. It has been for long a battleground between Austria and Italy, which accounts for the importance to Italy of the Trentino (*q.v.*).

In the Second Great War, the Po constituted one of the barriers which had to be forced during Gen. Alexander's campaign against the German armies in Italy. The river was crossed by 23 road and rly. bridges, over which most of the German supplies were carried. Alexander had intended capturing the bridges intact with airborne troops, but the depletion of his forces in preparation for the Riviera landings and the necessity of disrupting enemy communications led to his ordering the Tactical Air Force to destroy the crossings. This it achieved during July 12-15, 1944. Thereafter the Germans were obliged to maintain communications by emergency bridges which were used at night and dismantled and hidden by day. On April 24, 1945, the Allied 5th and 8th armies both crossed the Po. First British troops over were Grenadier Guards and N.Z. infantry (with the 8th army).

Poaching. Term used in English law for trespass upon another's land in pursuit of game or fish. The game laws of Great Britain, which may be traced back to the forest rights exercised by Saxon monarchs, are today a tangle of statutes of various dates. They rest upon the legal doctrine that wild animals are not the absolute property of anyone until they have been "reduced into possession" by killing or capture. Thus, though ownership or occupation of land gives exclusive right to take any game upon it, an infringement of that right is not larceny of the game, but a poaching offence.

The main provisions of the various Acts of parliament directed against poaching may be summarised thus: Trespassing in pursuit of game by day, *i.e.* between an hour before sunrise and an hour after sunset, is punishable summarily by a fine of £2. This becomes £5 if the party exceeds

four in number. The penalties for night poaching are three months' hard labour for a first offence, double that term for a second, and seven years' imprisonment for any subsequent offence. Persons found on highways by night for the same purpose incur a like punishment. If violence with any offensive weapon is offered, or if any member of a party of three or more night poachers is armed with such a weapon, the offenders are liable to a heavier sentence. Persons suspected of poaching may be searched by a constable, and if any game or any instrument of poaching is found on them, they become liable to a fine, and the property may be forfeited.

Private fishery rights are protected. No one may knowingly take or attempt to take or expose for sale any immature fresh-water fish, or use or have in his possession for the purpose of catching fresh-water fish any illegal implement, which includes lights, wires, spears, or gaffs. It is an offence to take fish in private waters.

The game laws of the mother country have not been applied to any of its oversea possessions; but many of these have passed less stringent Acts for the protection of wild animals. See Game Laws.

Pocahontas (c. 1595-1617). North American Indian princess, sometimes known as Matoaka. She



Pocahontas,
Indian princess

was a daughter of Powhatan, overking of the Indian tribes of Virginia. About the age of 12 she is said to have saved the life of Captain John Smith, who had been captured by the Indians, though the story of her doing so has been doubted. In 1612 she was lured upon an English vessel by Samuel Argall (*q.v.*), and taken to Jamestown as hostage for the good behaviour of the Indian tribes. Converted to Christianity, she was baptized Rebecca, and in 1613 married John Rolfe (1585-1622), a leading Virginian settler. In 1616 she accompanied her husband to England, and in March, 1617, died at Gravesend, leaving one son who went to America, and from whom many prominent Virginian families claim descent. Her story has inspired several works of fiction. Consult P. and her Companions, E. D. Neill, 1869; P. and her Descendants, W. Robertson, 1887.

Pochard (*Nyroca ferina*). Diving duck of the sub-family Anatidae. An expert diver, the male has a reddish-brown head, black breast and back, and grey sides. The female has greyish brown plumage. It is common as a migrant to Great Britain in the winter; but a few pairs are resident and breed in marshy places. The red-crested pochard is a very occasional visitor. The bird is found over a wide range in Europe, Asia, and N. America. Pron. pokard.



Pochard, a wild diving duck
which visits Great Britain

Pocket. Literally, a little pouch. It is used for the receptacles which are part of many articles of clothing; also for the net receptacles at the sides and corners of a billiard table. In mining a pocket is a cavity which is filled with metaliferous ores.

The term pocket is used in aeronautics to describe a condition of flying where the flow of wind over the earth's surface is not entirely horizontal, but tends to produce a vertical component in the movement of the air, due to natural obstructions such as ridges of hills. When the ridges are at right angles to the direction of the wind, the air passes over the summit to produce an upward current on the windward side and a downward current on the lee. Where a number of ridges exist, a series of eddies is induced. An aircraft experiences sudden increases and decreases of lift and a bumping effect in the pocket between the two eddies.

Pocket of resistance is a military term for a heavily defended point which holds out after it has been passed by the main tide of an advance. Notable examples in the Second Great War were the Channel and Atlantic ports retained by the Germans after the liberation of most of France.

Pocket Battleship. Popular name for the Panzerschiff (armoured ship) developed by the German navy after the First Great War. By the Versailles treaty, Germany was forbidden to build warships exceeding 10,000 tons displacement, which restricted her fleet to cruisers. To mount heavy armament on minimum tonnage, three vessels, the Admiral Graf Spee, Deutschland (later renamed Lützow), and Admiral Scheer, were designed with a paper tonnage of 10,000. Each mounted a

main battery of six 11-in. guns, a secondary battery of eight 5.9-in. guns, six of 4.1 ins., eight A.A. guns, and eight torpedo tubes. The ships were welded instead of riveted, and were driven by eight Diesel engines each developing 6,750 h.p. to give a maximum speed of 26 knots. Most notorious of these pocket battleships was the Admiral

Graf Spee (*q.v.*), scuttled in the River Plate, Dec. 17, 1939. Documents captured later proved that the Germans had infringed the Versailles treaty, as these ships displaced nearly 15,000 tons.

Pocket Borough. Formerly a borough of the U.K. in which the political representation was controlled by a single man, or a small group, who could dictate to the electors how they should vote. These boroughs were abolished by the Reform Act of 1832.

Pocket-Gopher (*Geomys*). A family of rat-like rodents, which occur in N. and Central America. The name is derived from their very large cheek pouches. The animals are about 8 ins. long without the tail, and the body is covered with soft velvet-like fur. They burrow like moles beneath the surface of the ground and feed upon the roots of plants. Large chambers are constructed in which the animals collect great stores of potatoes, nuts, and seeds.

Pocklington. Market town of the E. Riding of Yorkshire, England. It is 13 m. E. of York by rly. The chief buildings are the church of All Saints, mainly Early English, and the grammar school, founded in 1515 by the Rev. John Dolman, and now a large public school with scholarships and exhibitions. The industries are all connected with agriculture, as the town is in an agricultural area. A canal, now used only for fishing, connects the town with the Derwent. Market day, Sat. Pop. est. 3,000.



Sir George Pockock,
British admiral

Pockock, SIR GEORGE (1706-92). British admiral. Born March 6, 1706, he entered the navy in 1718 and saw extensive service in both the West and the East Indies, where

he was appointed commander-in-chief in 1757. He became famous by his remarkable series of actions, 1758-59, against the French in the E. Indies, as a result of which the French never recovered their position. He retired in 1766 and died April 3, 1792.

Pococke, RICHARD (1704-65). British traveller. Born at Southampton, he graduated at Corpus Christi College, Oxford, and travelled in Greece, Egypt, Palestine, and Mesopotamia, 1733-42. On his return he published *A Description of the East and Some Other Countries*, 1743-45. He also made several journeys through England, Ireland, and Scotland as far as the Orkneys. In 1756 he became bishop of Ossory and in 1765 was translated to Meath. He died at Charleville, Ireland. His *Tours in Scotland*, 1747, 1750, 1760, were edited by D. W. Kemp, 1887.

Pod. Popular name for certain types of dry fruits, of which the legume and the silique are the chief. The legume, familiar in the pods of peas, beans, and furze, is characteristic of the entire family Leguminosae. It develops from a single carpel and opens by splitting along both edges. The silique has well-known examples in the seed-vessels of the wallflower, the cabbage, and all through the great family Cruciferae. The silique originates in two carpels, and when the seeds are ripe the two sides or valves split away from a central frame across which is spread the replum or partition which separates two layers of seeds. *See* Fruit; Manila Tamarind; Mezquit; Pea.

Podestà (Lat. *potestas*, power). Italian municipal officer. The podestà was originally appointed by the emperor and afterwards by the citizens, usually for a year. He was the supreme administrative and military official in the commune. The office was instituted in the 12th century, and lasted, though latterly shorn of much power, into the 16th century. The title was restored by Mussolini, in place of that of sindaco (mayor).

Podgoric or **TRIGRAD**. Town of Yugoslavia. It is situated on the Moracha, about 16 m. E. of Cetinje. It has a transit trade, and the industries concern tobacco and sawmilling. Here was Diocleia, birthplace of the emperor Diocletian. The town, with a mixed Turkish and Albanian pop., became the commercial capital of Montenegro soon after that state achieved independence. In the First Great War it was held by Austrians from Jan., 1916.

Podiebrad, GEORG BOCKZKOV, or **GEORGE** OF PODEBRADY (1420-71). King of Bohemia. Born at Podiebrad, April 6, 1420,



Georg von Podiebrad, King of Bohemia

he gained a name in the Hussite wars against the Austrians, and brought about the election of Ladislaus as king of Bohemia in 1453, himself acting as regent for the young king. On the death of Ladislaus in 1457 he was elected, early in 1458, to succeed. His efforts at religious conciliation failed, and in 1466 he was excommunicated, and attacked by the Catholic nobles of Bohemia and Silesia and by Matthias, king of Hungary. Matthias was defeated and had to sue for peace, but Podiebrad died, March 22, 1471, before the treaty was concluded.

Podocarpus. Genus of evergreen coniferous trees of the family Taxaceae. They are chiefly natives of the extratropical regions of the S. hemisphere, but with representatives in E. Asia and tropical America. They are closely related to the yews (*Taxus*), which some of the species resemble in their two-



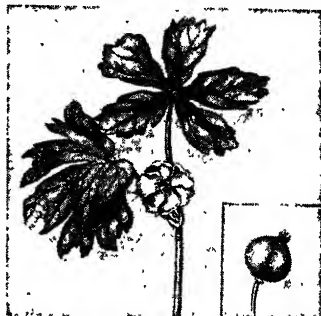
Podocarpus. Leaves and, inset, fruit of *P. ferrugineus*

ranked leaves and pulpy fruit. Several species afford valuable timber, e.g. the miro (*P. ferrugineus*) of New Zealand, with close-grained reddish wood; the Totara pine (*P. totara*), also of New Zealand; and the Illawarra pine or kidney-wallum (*P. elatus*) of Queensland and New South Wales, with light yellow, durable wood, useful for piles, masts, and spars.

Podolsk. Town of Moscow region, R.S.F.S.R., about 25 m. S.S.W. of Moscow, on the main Moscow-Tula rly. A town of small importance until after the 1917

Revolution, it greatly increased in size during the 1920s, many factories being established here. Pop. 72,422.

Podophyllum (*P. peltatum*) or **MAY APPLE**. Perennial herb of the family Berberidaceae, native of N. America. It has a creeping rootstock and thick fibrous roots. Barren stems end in a large round leaf with lobed margins, attached by the middle; flowering stems with two one-sided, lobed leaves, and between them a solitary, nodding, white flower, which is



Podophyllum or May Apple. Leaves and flower; inset, fruit

succeeded by a large yellow oval fruit with edible pulp, sweet and slightly acid. From the rootstocks, collected in autumn, the resinous extract known as podophyllin is obtained, and used as a cathartic medicine. Indian podophyllum rhizome comes from *P. emodi*, a plant growing on the lower slopes of the Himalayas.

Podsol (Russ., ash). Type of soil. It is found in temperate and cold regions where there is considerable rainfall and the soil has been extensively leached by the downward movement of water through it. Below a surface layer of humus or peat the soil is usually ashy grey as a result of the removal of bases by the rain water which has become acid. The soil may, however, be stained brown by decomposing vegetable material. Below this soil layer iron oxides form a brown hard-pan which grades downward into broken and unweathered rock. Podsoles are impoverished soils forming heathery moorland or pine forests. Porous rocks such as sandstones form podsoles more easily than less permeable ones, because of the ease with which rain water can percolate through them. The formation of a podsol type of soil is known as podsolisation.

Poe, EDGAR ALLAN (1809-49). American writer. He was born at Boston, Mass., Jan. 19, 1809, the

son of an actor of Irish descent who had married an English actress, Elizabeth Arnold. Both his parents had died by the time he was three years old, and he was adopted by John Allan, a tobacco merchant of Virginia, who sent him, during a visit to England, to the Manor School, Stoke Newington. In 1820 Poe returned to the U.S.A., and, after attending school at Richmond, Va., went to the university of Virginia, where he matriculated with distinction in 1826. He had, however, contracted debts, mainly through gambling, which Allan refused to pay, insisting that Poe should take up a position in his office. He left this after a brief time, joining the U.S. army, becoming a sergeant-major, and, in 1830, entering West Point to train as an officer. Within a year, however, he was dismissed for insubordination, and was thenceforth dependent on his own resources, assisted only by Mrs. Clemm, his father's widowed sister, whose daughter, Virginia, he married in 1836, when she was not quite 14.

Poe had been writing verses since he was 15, and published volumes of juvenilia in 1827 and 1829, a third, more mature, volume following in 1831. In 1833, the Baltimore Saturday Visitor having offered prizes for fiction and poetry, Poe won the fiction prize with the tale, *A MS. Found in a Bottle*, and was recommended for the poetry prize also, the judges deciding that one competitor should have both.

Poe held various editorial positions, though none for long, mainly because of his intemperate habits. But in the Southern Literary Messenger of Richmond, and in other periodicals, he soon acquired a triple reputation, as a writer of skilful verse, an author of short stories of brilliantly fantastic plot and striking style, and a critic of unusual penetration.

His stories, though for the most part fantastic and showing the effects of his drinking and opium-taking, included *The Murders of the Rue Morgue*, the *Mystery of Marie Roget*, and *The Purloined Letter*, in which he laid down the main principles of the modern detective story in its most in-



Edgar A. Poe

tellectual form. It was, however, with the publication of *The Raven* in 1845 that he leapt into real fame, but he was already on the verge of the personal tragedies which led to his death. He was living at a cottage at Fordham, near New York, and his wife died there, Jan. 30, 1847, amid depressing surroundings. He wrote little more, though *The Bells* and *Annabel Lee* (the latter written in memory of his dead wife) soon established themselves in the affection of a wide public. His health grew worse, partly because of his grief, and partly because of drink and opium, and on Oct. 3, 1849, he was found in Baltimore in a state bordering on collapse, having apparently been taken around by a group of political fanatics, and forced to vote, impersonating various electors, at polling places in the city. He was admitted to hospital, and died Oct. 7.

Poe fits into no scheme of literary history. He was a solitary craftsman, whose work at its best shows a brilliance of conception and execution excelled only by the greatest. His verse is masterly in technique, though in some respects superficial. But his stories will always remain as monuments to his special type of fantastic imagination. Through his influence on Conan Doyle he must be regarded as the originator of the detective story. And his tales of horror and grotesquerie have influenced authors as different as R. L. Stevenson, Arthur Machen, M. P. Shiel, and E. H. Visiak. In France he has been even more widely influential than in Great Britain and the U.S.A. In 1922 there was opened, in an old house at Richmond, Va., the Poe Foundation, which now possesses an unrivalled collection of Poe manuscripts and other rarities, as well as an assembly of objects associated with Poe and a model of Richmond as it was in his day.

John Rowland

Bibliography. *Tales and Poems*, ed. J. H. Ingram, 4 vols., 1884; *Life, Letters, and Opinions*, ed. J. H. Ingram, 2 vols., 1886; *Complete Works*, ed. J. A. Harrison, 1902-03; *Life*, G. E. Woodberry, 2 vols., 1909; *Critical Study*, A. Ransome, 1910; *The Murder of E. A. Poe*, J. A. T. Lloyd, 1931; *Israfel*, H. Allen, 1935; *Life*, A. H. Quinn, 1942.

Poe, WILLIAM (1852-1934). British actor-manager. A Londoner, he was born July 22, 1852. Making his first stage appearance in 1876, he was the first modern producer to revive *Hamlet* without

scenery, at St. George's Hall, London, 1881. He ran the Old Vic, 1881-83, and became stage manager for Benson. In 1895 he founded the Elizabethan Stage Society, reviving plays by Marlowe, Jonson, Beaumont and Fletcher, etc. Poe was the first to point out that, in characterisation and in the delivery of verse, modern actors adopt the traditions of the 18th century as distinct from those of the Elizabethan open platform period. He dramatised Baring-Gould's *Mehalah*, 1886, and wrote *Shakespeare and the Theatre*, 1913. He lived until Dec. 13, 1934.

Poerio, CARLO (1803-67). Italian patriot. Born at Naples, Dec. 10, 1803, he supported every popular agitation for constitutional government, and was in exile, 1821-35. In 1835 he went back to Naples, and practised law until the rising of 1848, when the threat of revolution caused Ferdinand II to appoint him to the cabinet. But on the collapse of the national cause in 1849, Poerio was sentenced to 19 years in the galleys. Gladstone's exposure of the Bourbon atrocities, and his special reference to Poerio, had the tardy effect of releasing him in 1858, and he was elected to the Italian parliament of 1860. He died April 28, 1867. His brother Alessandro (1802-48), an eminent poet, shared his fortunes until wounded in battle against the Austrians. He died Nov. 3, 1848.

Poet Laureate. A poet crowned with bays or wreath of laurel. The custom originated in Greece, and was perpetuated in Rome, where Domitian gave the bays to Statius. Petrarch was similarly honoured in Rome in 1341. The custom was followed in Germany in the 15th and 16th centuries, and in 16th century Spain.

In England the title poet laureate was first applied to a poet attached to the court; known earlier as *Versificator Regis*, he was styled poet laureate in the time of Edward IV, the first holder being John Kaye, author of *The Siege of Rhodes*, a work printed by Caxton. John Skelton called himself both poet laureate and regius orator; he was crowned at Oxford and wore the laurel at Cambridge. Though Chaucer was a recipient of gifts from Edward III and Richard II, and Spenser was pensioned by Elizabeth, the English laureateship is usually dated from Daniel or from Jonson, to whom James I by letters patent gave a pension of 100 marks (about £67), a sum increased by Charles I to £100 and a tierce of canary

wine. In Southey's time the sum of £27 was substituted for the wine.

POETS LAUREATE FROM 1599

Samuel Daniel	1599-1619
Ben Jonson	1619-1637
Sir William Davenant	1637-1668
John Dryden	1670-1688
Thomas Shadwell	1688-1692
Nahum Tate	1692-1715
Nicholas Rowe	1715-1718
Rev. Laurence Eusden	1718-1730
Colley Cibber	1730-1757
William Whitehead	1757-1785
Rev. Thomas Warton	1785-1790
Henry Pye	1790-1813
Robert Southey	1813-1843
William Wordsworth	1843-1850
Lord Tennyson	1850-1892
Alfred Austin	1892-1913
Robert Bridges	1913-1930
John Masefield	1930-

Poetry (Gr. *poëtes*, maker, poet). When we speak of poetry we imply two main conditions. The first is a creative feat of the imagination, unlike the fact-finding concern of science. The essential idea that poetry is creative is contained in the word itself. The old Scottish poets were actually called the makaris. Aristotle stressed the inventive and ingenious aspect of poetic drama as a standard of judgement, though on such a formal principle alone, as Newman pointed out, "the inferior poem might be the better tragedy." The object of poetry is to create—for intellectual pleasure. The nearest that science can get to creation is in imaginative exploration, which must fall back inexorably if it steps outside the realm of demonstrable truth. But the unbridled eye of the poet seeks the unlimited truths of the imagination. Wordsworth says: "Poetry's object is truth, not individual and local, but general, and operative; not standing upon external testimony, but carried alive into the heart by passion; truth which is its own testimony."

Metre and Music

But this creative definition takes in much that is not, speaking literally, poetry. It would include imaginative prose and that quality, for instance, in a novel which is inventive or which might enable one to say that it was poetically written. A second condition is therefore needed to describe what poetry has meant, at any rate in European literature, for the last six hundred years. Since the beginning of the Renaissance the word poetry has presupposed a metrical form, also that the art of poetry is akin to that of music. When Dante defined poetry in his treatise *De Vulgari Eloquentia*, he called it *fictio*

retorica musice—a rhetorical fiction made musically. Chaucer linked it with music, and his contemporary, the French poet Deschamps, called it a branch of music. The submission to metre, and where suitable to rhyme, is likewise the poet's sign that imagination in its farthest flights still willingly disciplines itself to harmony and order.

"Poetry," said Shelley, "may be defined to be the expression of the imagination," but no such generalisation—nor Wordsworth's "emotion recollected in tranquillity"—can help to identify poetry; it can only describe or analyse what must first have been felt. It is unlikely that any definition could cover the inspirations of the ancient and the modern world, of epic, lyric, and drama. Shelley spoke of different inspirations as "episodes to that great poem, which all poets, like the cooperating thoughts of one great mind, have built up since the beginning of the world." What all these episodes of poetry have in common is heightened emotion, expressed rhythmically in heightened language—possibly to the point of grandeur, but if simply, then with heightened simplicity. Hazlitt said: "Poetry is the most emphatical language that can be found for the creations of the mind"; Leigh Hunt that "Poetry is a passion because it seeks the deepest impressions."

The Use of Imagery

This quality of emphasis is reinforced by poetry's abundant use of imagery, with which it loads its truth with cognate instances. To quote Hazlitt again: "The poetical impression of any object is that uneasy, exquisite sense of beauty or power that cannot be contained within itself; that is impatient of all limit; that (as flame bends to flame) strives to link itself to some other image of kindred beauty or grandeur; to enshrine itself, as it were, in the highest forms of fancy, and to relieve the aching sense of pleasure by expressing it in the boldest manner, and by the most striking examples of the same quality in other instances."

It is only, then, "by the consent and delight of poetic readers" that true poetry can be known. And it is by a consensus of opinion in regard to such delight over a period of time that a poem or poet is established. (An extreme statement of this delay is contained in Emerson's striking remark that "it was not until the 19th century, whose speculative

genius is a sort of living Hamlet, that the tragedy of Hamlet could find such wondering readers.") In our immediate centuries it may still be generally uncertain how much Pope was a poet, for instance, or what was the stature of Byron. But individual certainty operates immediately on the reader according to his own time and taste; the excitement of poetry is unmistakably either there for him as he reads, or not.

Eternal Idea of Beauty

One must not conclude from this that man is the measure of all worth, and that beauty is purely relative to his taste and judgement. There is, as Plato said, the eternal idea of beauty, which is something absolute, like certain moral truths—as that kindness is better than cruelty, absolutely, beyond opinion. True poetry, in this eternal sense, may sometimes be difficult to discern in the contingency of time, though rarely poetry of the very highest quality; in regard to this the verdicts of one century and of all centuries speak unanimously.

The place of poetry in the experience of mankind cannot be considered only in what it has to show in the printed word, and wholly apart from the more inchoate poetic emotion of men who are not poets. Someone said that every lover is a poet, and Shakespeare linked poets with lovers and lunatics. Much unconscious poetry in people has gone into place names, for example and into the naming of flowers. The origins of poetry, at any rate, are wherever there are stirred perceptions of that beauty which man's moral nature allies with greatness. In this general sense, poetic emotion is the high light in the life of everyone, and the actual reading of poetry the deliberate turning to that light. The habit of poetry reading, as physical exercises strengthen the body, undoubtedly fosters in those who form it a development of that general sensitiveness to beauty which made Hazlitt say: "All that is worth remembering in life is the poetry of it." See Verse.

Viola Meynell

Bibliography. Poetics, Aristotle, ed. S. H. Butler, 1902, ed. W. H. Fyfe, 1940; An Apologie for Poetrie, Sir Philip Sidney, 1595, ed. E. Arber, 1869; Discoveries upon Men and Matter, Ben Jonson, 1641; Lyrical Ballads, preface, W. Wordsworth, 1800; Lectures on the English Poets, W. Hazlitt, 1818; A Defence of Poetry, P. B. Shelley, 1821; Essays in Criticism, M.

Arnold, 1865-88; Theory of Poetry, 1924, and Idea of Great Poetry, 1925, L. Abercrombie; Poetry and the Modern World, Daiches, 1941; Critical History of English Poetry, H. Grierson and J. C. Smith, 1944; Poetic Image, C. D. Lewis, 1947.

Poetry Society, THE. Founded in London in 1909 and incorporated in 1923, to promote, in the words of Matthew Arnold adopted as its motto, "a clearer, deeper sense of the best in poetry and of the strength and joy to be drawn from it." The society conducts examinations in reading and speaking verse, organizes meetings and festivals, provides a headquarters for teachers of English and elocution, and publishes periodicals containing new poetry and critical articles. Its offices are at 33, Portman Square, W.1, and there are affiliated centres in Great Britain and the Americas.

Poets' Corner. Name given to part of the S. transept of Westminster Abbey, London. Here are honoured, and in many instances

Pogradets. Town of Albania. Situated 20 m. N.N.W. of Koritza on Lake Ochrida, it was captured by the Greeks on Dec. 1, 1940, during their defensive campaign against the Italians. At the German attack on Greece and Yugoslavia in April, 1941, the town passed into German-Italian occupation, during which it became a centre of the Albanian resistance movement. See Albania.

Pogrom (Russian, devastation). Deliberate massacre in Russia aimed at the destruction of a particular class, and especially applied to organized attacks upon Jews. Pogroms were introduced into Germany by the Nazi party. The most savage was on Nov. 10, 1938, following the assassination of Vom Rath, an official of the German embassy in Paris, by a Polish Jew. Synagogues were burnt down and Jewish shops, homes, hospitals, and orphanages destroyed. The Germans instigated similar pogroms in Poland after they occupied it.

Poilu (Fr., hairy or bearded). Popular name given to the French soldier. It was first used for the recruits as distinct from the older men and implied affectionate respect, not devoid of humour. Later the word came to signify the common soldier of France, particularly under the conditions of trench war in the First Great War.

Poincaré, JULES HENRI (1854-1912). French scientist, born April 29, 1854, at Nancy. A qualified engineer, he was in 1886 appointed professor of mathematical physics in the faculty of sciences, Paris, and in 1896 he became professor of celestial mechanics. A cousin of Raymond Poincaré (*v.i.*), he died July 17, 1912.

Poincaré was one of the most brilliant mathematicians of the 19th century, not only carrying out investigations into the problem of three bodies (cubes, cones, cylinders), and the theory of functions, in which he introduced an entirely new mathematical weapon, but also investigating the theory of non-Euclidean geometry, the higher algebraic functions, etc. He was awarded the gold medal of the Royal Astronomical Society, and the Sylvester medal of the Royal Society, and the gold medal of the French Association for the Advancement of Science. His chief books are *Leçons sur la Théorie Mathématique de la Lumière*, 2 vols., 1889-92; *Cours de Physique*, 13 vols., 1890; *Électricité et Optique*, 2 vols., 1890-91; *Méthodes Nouvelles de la Mécanique Celeste*, 3 vols., 1892-99; *Calcul des Probabilités*, 1896.

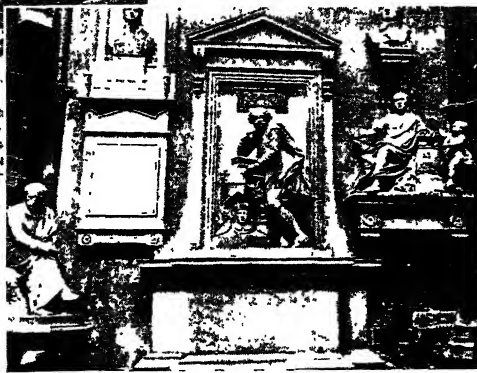
Poincaré, RAYMOND NICOLAS LANDRY (1860-1934). French statesman. Born Aug. 20, 1860, at Bar-le-Duc, he studied law at Nancy and Paris and was called to the bar. He started a political career by writing and acting as secretary for deputies of the moderate Right. Elected to the Chamber in 1887, for Commercy, Meuse, he held office as minister of education, 1893, and of finance, 1894, and was vice-president of the chamber, 1895-98. A senator from 1903, he succeeded Caillaux

in 1912 as premier and foreign minister, and improved Franco-Italian relations.

On Jan. 17, 1913, Poincaré was chosen president. He systematically prepared for the war he had long foreseen. With Barthou as premier to re-establish the three years' conscript service, with Delcassé as ambassador to St. Petersburg, with a budget that pro-



buried, celebrated British poets and men of letters and the arts, among them Chaucer, Spenser, Jonson, Dryden, Addison, Handel, Garrick, Macaulay, Thackeray, Dickens, Browning, Tennyson, Hardy, and Kipling. In front of Dryden's tomb is a blue slab believed to commemorate Robert Hawke, murdered in the choir of the Abbey in 1378 by followers of John of Gaunt.



Poets' Corner, Westminster Abbey. Shakespeare's memorial, and busts of Southey, left, and Burns, right. Upper picture, some of the other memorials, with Thomas Hardy's grave in the foreground

vided for strengthened military and naval defence, and with his own visits to England and



Raymond Poincaré,
French statesman

Russia, he secured the Entente against Germany. In July, 1914, he sent an appeal to George V for Anglo-French solidarity. During the First Great War, in 1917, he called upon his personal adversary Clemenceau in order to have the strongest personality available as head of the cabinet.

He had proved his valour as president, but he relinquished office in 1920. He resigned the chairmanship of the reparations commission after a few months; overthrew Briand, whom he thought insufficiently nationalist during the Cannes conference in 1922, and became again premier and foreign minister; favoured the Rhenish separatists in Germany, occupied the Ruhr against British objections in 1923, and secretly supported Mustapha Kemal against the Greeks. Ousted in 1924 by an electoral victory of the Left, he was recalled to save the franc in 1926, and his stabilisation plan succeeded. Briand was now allowed to pursue the policy of Locarno, and Poincaré himself in 1928 received Stresemann with a view to improving Franco-German relations. In 1929 he retired from political life. He died Oct. 15, 1934.

Poincaré was one of the most straightforward and strong-minded statesmen of modern France. His brilliance was recognized in 1909 by his election to the Academy, and in 1914 he was rector of Glasgow university. His memoirs, *Au Service de la France*, 7 vols., 1925-31, and other political and historical writings are classics in style. *Consult* Lives, by H. Girard, 1913; S. Huddleston, 1924; Raymond Poincaré and the French Presidency, G. Wright, 1943.

Poinding (A.S. *pyndam*, to pound). In Scots law, the taking of goods in execution or by way of distress. It is either real, called pointing of the ground, meaning removal of effects on the land for payment of a debt attaching to the land, *debitum fundi*; or personal, seizure of movables for rent or debt. The word is also applied to the impounding of stray cattle.

Poinsettia (*Euphorbia pulcherrima*). Shrub of the family Euphor-

biaceae, native of Mexico. It has oval-elliptical leaves and small greenish-yellow flowers. There are a number of large leaf-like bracts around the flowers, coloured a brilliant vermillion.

Point. In geometry, an indicator of position, having no magnitude. Any point satisfies certain geometrical conditions. Many problems involve either the discovery of the position (or successive positions) of a point satisfying stated conditions, or the elucidation of conditions pertaining to points in stated positions. The boundaries of lines are points; lines intersect at points. A line can be regarded as an assemblage of points (i.e. successive positions) or as the path of a moving point. The line which a point describes if it moves so as to satisfy given geometrical conditions is called the locus of the point. In analytical geometry the position of a point is indicated by its coordinates. *See* Geometry.

Point. Term in ballistics. There are a point in the trajectory of a projectile where the curve begins to decline towards the ground; a second point at which the lowest horizontal line of sight cuts the trajectory; and a point at which a horizontally-fired projectile strikes the horizontal plane containing the base of the gun mounting.

Point. In heraldry, part of the shield, as in the terms honour point, fesse point, etc. All points are described under Heraldry.

Point. In music, a dot employed in medieval notation and placed either after a note or above the staff, in order to affect the value of certain notes. The principal dots were known as points of (a) augmentation; (b) perfection; (c) alteration; (d) division. Point was also an old term for a note.

Point. Unit of scoring in many sports and pastimes. The application of the term falls really into two distinct categories. Points may be registered as an essential feature throughout the game, e.g. every rally at lawn tennis; every hand at bridge, every move in attack or defence at boxing, will result in so many points being credited to one side or the other; at Rugby football a try counts 3 points and conversion to a goal 2 extra points. Or points may be awarded on the result of the match alone; e.g. in a chess tournament a win is worth one point and a draw half a point to each player; in League football tables two points are awarded for a win and one to

each side for a draw; while in county cricket various points are given according to the outcome of the match.

Point. At cricket, a position in the field square to the batsman on his off-side and about 10-15 yds. away. This old-fashioned position is now less commonly seen than either backward point, which is deeper and behind the wicket, or silly point, only a few yards from the bat and in front of it.

Point Duty. That part of a policeman's work concerned with the directing of traffic by signals. Until the introduction of traffic lights, important road crossings and junctions in large cities throughout the world were controlled by one or more police officers or traffic marshals. Where unlighted points still exist in London, point-duty policemen perform an 8-hour tour of duty with 3 half-hour breaks for meals. The officer on duty may leave his point only if required for more essential police duties. In Great Britain, point-duty police direct traffic from ground level and give signals by hand, but in many U.S. and Continental cities they are accommodated in towers or on pedestals. In some cities, e.g. Paris, they give the right of way by blowing a whistle.

Pointe-à-Pitre. Town of Guadeloupe, French West Indies. The chief commercial centre of the colony, on Grande Terre, it has a good harbour with a trade in sugar, vanilla, and cacao. The town was almost destroyed by earthquake in 1843 and by fire in 1871. Pop. 43,551.

Pointe-des-Galets. Chief port of Réunion. It is connected by a coast rly. of about 80 m. with St. Benoit and St. Pierre, and has a trade in sugar, rum, and tapioca. It is administered according to French municipal law.

Ponter. Old breed of sporting dog of Spanish origin, which in its British type has been crossed with the foxhound and the greyhound. It is characterised by the habit of pointing, or stopping dead and remaining rigid when it finds game at close quarters. This dog,



Ponter. Prize-winning specimen of this breed of sporting dog

which belongs to the hound group, hunts by scent, but follows the body-scent, not the foot-scent, of the game, wherefore it should carry its head high when working, and not low as the foxhound does. A large specimen stands about 24 ins. high at the shoulder and weighs nearly 60 lb. In general appearance it is not unlike a foxhound, but is always parti-coloured, liver and white being the favourite combination. *See Dog colour plate*; Kennel.

Pointillism. In painting, the representation of vibrating light and atmosphere by means of pure colours laid on in juxtaposed points or dots. This technique was an offshoot of the Impressionist doctrine of the division of tones, and was exploited by Seurat, Signac, (*qq.v.*), and others. *See Neo-Impressionism.*

Pointing. In music, the method of marking the prose Psalms so as to ensure correct accentuation and unanimity in singing them to the Anglican chant. At one time the rendering seems to have been empirical, and was probably not unsatisfactory with singers constantly rehearsing together, but when it became more general to chant the prose Psalms in place of the metrical versions, it was necessary to devise some way more useful to the average choir. The method now in vogue is based upon the application to the words of the bar-lines in the music, so that in mediation and cadence the syllables may coincide with the notes, all redundant syllables being sung to the receding note.

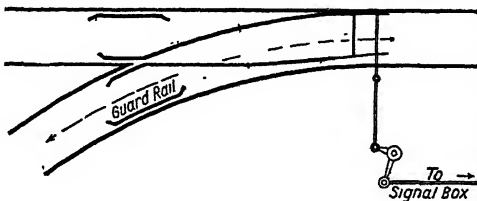
Pointing. In brickwork and masonry, the ornamental finishing of joints on the face of a wall, etc. The general principle is that the joints are raked out to a shallow recess, and then new material is filled in. Thus, when a wall is to be pointed, after raking out the joints it is cleaned down and given a colour wash. Next a stopping of the same colour as the wash is filled in, made from lime mortar and a little cement. On top of this goes the pointing material which, for white joints, is composed of lime-putty and silver sand. The narrow vertical and horizontal lines of the pointing are cut cleanly by means of a knife and straight-edge. The various patterns used comprise the recessed vee-joint, grooved joint, and beaded joint, for which a tool called a jointer, shaped to the counterpart of the desired pattern, is worked over the filled brickwork joint.

In the pointing of masonry, the joints may be left flush, or be

raked out to leave recesses. Weathered and struck joints are also used, and projecting forms of pointing are employed, much as in brickwork. Another meaning of the term pointing is for the use of the mason's tool known as a point, for roughing out carving and figure work. *See Bricklaying.*

Point Lace. Light embroidery employing a foundation usually of hexagonal net, and handworked with the point of a needle, whence its name. Seen under a magnifying-glass the more solid portions of the design are found to consist of looped (not of twisted or plaited) threads. Certain patterns of pillow lace (*q.v.*) are also, though incorrectly, called point, *e.g.* Bucks point and point d'Angleterre. *See Lace and colour plate.*

Points. Device by means of which a railway track branches into two or three separate tracks, or by which a train is enabled to pass from one track to another.



Points. Crossings and points at York station, England. A. Single junction. B. Diamond crossing. C. Single slip. D. Double slip. E. Cross-over road. F. Scissors crossing. G. Special scissors crossing. Top, diagram showing disposition of rails for a single junction

Points are also known as switches and turnouts. At a given point in the track the two outer rails are laid so as to diverge, one or both of the rails being curved outwards for the purpose. From the same point, in a single turnout, an additional rail tapering to a knife-edge and known as a tongue-rail is laid on the inside of each of the main rails, one being arranged tangentially to one outer rail and the other tangentially to the other outer rail, so that these tongue rails converge to a crossing point; they are rigidly cross-connected by bars or rods, and rest upon metal chairs.

Two tongue rails with their connexions are known as a switch and are connected by rodding to switch levers in a signal cabin at the side of the track, by means of which the knife-edge of one may be drawn tightly against the inner edge of one of the outer rails, leaving a space between the other knife-edge and the other outer rail

or vice versa. By this means the knife-edge guides the wheel flanges of vehicles on to one of the tracks, the space on the opposite side allowing the opposite wheel flanges to pass. At the point where the tongue rails, continued as ordinary rails, would otherwise cross, their ends are splayed apart, and the pointed end of two other rails spliced together is inserted between them, leaving a clear space for wheel flanges.

The spliced rails in turn diverge and, continued, form the two extra rails required for two separate tracks. The pointed end of the spliced rails is called a frog, and, with the splayed ends, constitutes what is known as the crossing. On either side of the crossing, on the inner edges of the two outer rails, a short length of guard rail is fixed, to prevent flanges

from fouling and mounting the frog. In cases where the track branches into three it is termed a three-throw switch; the arrangement is more complicated as additional tongue rails are introduced. When a frog points in the direction from which trains approach, the switch is a facing switch; when in the opposite direction, a trailing switch.

The curvature of rails at a turnout is determined by the angle of crossing, *i.e.* the angle at which the switch-rails would cross, measured on the gauge line, if not played at their ends. The greater the angle the sharper the curvature; both are determined by the gauge of the railway, the speed at which trains have to be diverted, and other reasons. See Railways.

Points Rationing. Scheme introduced in the U.K., Dec. 1, 1941, and maintained until May 19, 1950. It was akin to that governing clothes rationing, and allowed the consumer a choice among a range of foodstuffs. At first it comprised rationed distribution of tinned meats, fish, and beans, with special ration books allowing 16 points monthly. It was extended to include biscuits, tinned fruits and milk, macaroni, spaghetti, cereals, porridge oats, foreign cheeses, and dried fruits, with an increased monthly allowance of points. See Ration.

Point System. In printing, the adoption of type-sizes according to a standard of 72 points to the inch (one point = 0.0138 in.). Each increasing type size gives an exact multiple of points. The usual sizes range from 5 pt. to 12 pt. for text type, and from 14 pt. upwards (18, 22, 24, 30, 36, 48, 60, and 72 pt.) for headings and display type. The text of this Encyclopedia (except for bibliographies, tables, etc., in 7 pt.) is set in 8 pt. The point system originated in the U.S.A. See Type.

Point to Point. Name given to a type of race for hunters. Such races are held under the auspices of a hunt, and are usually divided into two classes: for welterweights, over 13 stone, and for light-weights under that figure. Women also participate. Usual conditions are that the horses entering must have been regularly hunted, and must be ridden by their owners. The course is generally one of three or four miles, over fair hunting country. See Steeplechasing.

Poiré, EMMANUEL. Real name of the French caricaturist better known as Caran d'Ache (*q.v.*).

Poise. The C. G. S. unit of viscosity. The viscosity of water at 20° C. is approximately equal to $\frac{1}{100}$ poise, *i.e.* one centipoise.

Poison (Lat. *potio*, draught). Substance which, when taken into the mouth or stomach or absorbed by the blood, is capable of seriously affecting health or destroying life. Some poisons have a local action only, *e.g.* strong mineral acids which injure the tissues with which they come directly in contact. When well diluted they are not poisons. Other poisons, *e.g.* morphia, have no local action, and produce symptoms only after absorption into the system.

A poison inhaled in the form of a gas, or injected hypodermically straight into the blood stream, acts with great rapidity. When swallowed, absorption is much less rapid, and as the process of elimination acts concurrently, an amount taken by the mouth may be less dangerous than a smaller amount injected subcutaneously. Poisons can also be absorbed through the skin. Some poisons, *e.g.* alcohol, morphia, cocaine, when taken for a long period, gradually confer a degree of tolerance which enables the taker to swallow quantities that would otherwise be fatal.

In the treatment of poisoning, the first object aimed at is removal of the poison from the system. Vomiting may be produced by tickling the back of the throat with a feather, or by the administration of an emetic—a tablespoonful of mustard, or one or two tablespoonfuls of salt in a tumbler of warm water. This treatment is suitable in all cases of poisoning, except those due to the alkalis, in which straining the damaged or corroded tissues may lead to perforation of the stomach. The treatment for strong acid poisoning is to administer an alkali, calcined magnesias being the best; but in an emergency sodium bicarbonate, chalk, or even plaster from the ceiling may be given, and, failing these, the poison should be diluted by administering large draughts of water.

In poisoning by caustic potash or other alkalis, water with vinegar or lemon juice should be given to neutralise the acid. Another method of removing poison is by means of the stomach-tube. A long, flexible indiarubber tube is passed by the physician into the stomach, and the tube and stomach are then filled with water through a glass funnel. By lowering the funnel, the fluid is drawn off from

the stomach by syphonage. Thus the stomach can be washed out as frequently as necessary, and antidotes introduced. With such poisons as fungi, in which the onset of the symptoms is delayed for several hours, much of the poison is apt to have passed on from the stomach into the intestines, and in these cases administration of a brisk purge is recommended.

Antidotes to poisons act in various ways. The object in some cases is to convert the poison into an insoluble substance. Thus, in oxalic acid poisoning, soluble calcium salts are given to precipitate the insoluble calcium oxalate. In poisoning by metallic salts, such as the corrosive sublimate or mercuric chloride, albuminous substances like white of egg are useful, as they convert the poison into albuminates, which are much less soluble. These, however, are slowly digested, so it is still necessary that they should be removed from the system by emesis or washing out. Other antidotes act as physiological antagonists, *i.e.* they produce the opposite effect of the poison. With signs of heart failure, ether, strychnine, or caffeine may be administered. Respiratory failure may need treatment by artificial respiration. In any form of poisoning prolonged vomiting and severe pain may make administration of morphia advisable.

Poisoning by vegetable food, with the exception of fungi, is rare, occurring almost exclusively as a result of accidental contamination of the food, as, for example, when lead is dissolved out of the vessel containing preserved fruit by the action of the fruit juices.

MEAT. Poisoning by meat is nearly always the result of acute infection by bacteria, following the eating of diseased or putrefying meat. Usually the animal from which the meat has been prepared has been found to be suffering from infection with the *Bacillus enteritidis* of Gärtner, an organism which belongs to the paratyphoid group. The disease has been found in cows after septic poisoning following calving, the bacillus occurs less frequently in sheep and pigs.

Botulism is a rare form of poisoning due to the presence of a micro-organism, which has been found in infected meat that has been potted, or otherwise preserved so as to exclude air.

The symptoms of poisoning from meat usually begin from 6

to 12 hours after the food has been eaten. Sometimes there is a delay of from 12 to 48 hours. They may begin suddenly with acute onset, or more gradually with nausea, loss of appetite, and feelings of ill-health. The most marked symptoms are vomiting, pain, or colic in the abdomen, headache, profuse diarrhoea, pain in the back, and rise of temperature. Rashes on the skin sometimes occur, and, in severe cases, delirium. The great majority of people recover, but in severe cases there may be failure of the action of the heart, collapse, and death. When the symptoms begin early, some relief may be obtained by inducing the patient to vomit; but usually the food has passed on from the stomach before the condition is recognized.

Any decomposing fish may give rise to poisoning. Mackerel is especially liable to become rapidly unfit for food. Crabs, lobsters, and other shellfish are equally dangerous if not fresh. Oysters and mussels, if grown in sewage-polluted waters, may convey typhoid. The symptoms are those of irritation of the stomach and intestines. Milk may be responsible for epidemic poisoning, if infected by organisms; it may also convey bacterial diseases.

The Law on Poisons

The sale of poisons in the U.K., according to the Pharmacy and Poisons Act, 1933, is under the control of the poisons board, a committee representing government departments. This board prepares the poisons list, which is approved by the Home secretary. This list is in two parts. Poisons in the first may be sold only by authorised sellers; those in the second may be sold by a wider class of persons called listed sellers (because their names are on the local authority's list). The poisons in the second part are those normally used for purposes other than the treatment of human ailments. No one may be an authorised seller unless he carries on the business of selling drugs by retail and unless (subject to some relaxations where the business is carried on at two or more premises) the sale of all retail drugs is under the personal supervision of a registered pharmacist. Poisons in the first part of the list may not be sold unless the purchaser is known to the seller or is vouched for by a householder. The seller must enter the sale in a book and the entry must be signed by the purchaser.

There are some relaxations of these rules, e.g. in the sale of animal medicines. The container of any poison sold must be labelled with the word Poison and the name and address of the seller.

Control under the above Act is complementary to that imposed by any other enactments, e.g. the Dangerous Drugs Acts, which bring under special control a number of substances, including opium, cocaine, morphine, and Indian hemp. It is unlawful for a person to be in possession of a dangerous drug unless he is a pharmacist, medical practitioner, veterinary surgeon, etc. Authority to possess dangerous drugs may be withdrawn.

Poison Gas. Term used for chemical agents which may be used in warfare to incapacitate or kill. Gases, together with smokes and incendiary substances, constitute the materials of Chemical Warfare (*q.v.*).

Poison Ivy (*Rhus toxicodendron*). Bushy shrub of the family Anacardiaceae. It is a native of N. America, where it is abundant in woods, thickets, and hedgerows, often climbing to considerable heights by means of rootlets, after the manner of ivy. The leaves are divided into three oval or rhombic leaflets, paler and downy beneath. It has minute, whitish flowers in panicles, succeeded by small cream-coloured berries. The whole plant is highly poisonous, and many persons are so susceptible to its influence that even brushing the plant with the dress may cause serious trouble. Smoke from fires containing it has been known to produce this effect.

Poison elder (*Rh. vernix*), which has from 7 to 13 leaflets, is a more erect shrub and is also extremely poisonous. The poison oak is a similar plant, which may be distinguished by the more serrated leaves.

Poissy. Town of France, in the dept. of Seine-et-Oise, it is 17 m. by rly. N.W. of Paris. It stands on the left bank of the Seine on the edge of the forest of St. Germain. The church of Notre Dame is a fine example of the Transition style. There are iron and steel works. Here, in 1561, was held the abortive conference between the Roman Catholics and Protestants known as the Colloquy of Poissy. Pop. 13,375.

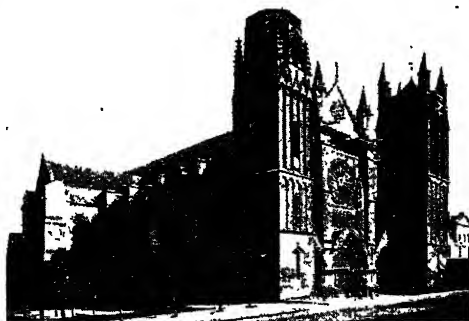
Poitiers. Town of France, capital of the department of Vienne and formerly of the province of Poitou. It is built on a plateau encircled by the Clair and Boivre, 60 m. S.S.W. of Tours, on the Bordeaux rly. It is famed for steep, tortuous streets and ancient houses. Numerous ecclesiastical buildings include the Romanesque-Gothic cathedral of S. Pierre, 1162-1379; the Temple S. Jean, a baptistery dating from Merovingian times; the Romanesque church of Notre Dame la Grande, dating from the 11th century; the church of Montierneuf, begun in 1077 by William VI, duke of Aquitaine and count of Poitiers, who is buried within its walls; and S. Radegonde (11th century), erected on the site of an ancient edifice which contains the tomb of the town's patron saint, who founded the abbey of the Holy Cross. Secular buildings include the palais de justice, and the university in the former Hotel-Dieu. Among bridges, the Pont Joubert dates from the 12th century. There are ruins of a Roman amphitheatre and baths. Near the tombs of a number of Christian martyrs (discovered in 1879) is a large dolmen, around which was formerly held the fair of S. Luke.



Poitiers arms

Industries include brewing and the manufacture of leather, hosiery, and cloth. Pop. 48,546.

Its situation has given Poitiers a peculiar importance in military and political history. The capital of the Gallic tribe of the Pictones (or Pictavi), it was known as Limonum at the time



Poitiers, France. West front of the cathedral of S. Pierre

of the Roman conquest. Christianity was introduced in the 3rd century; the first bishop was S. Hilarius. Alaric II was defeated by Clovis at Vouillé near by in 507, and the town became part of the Frankish dominion. In 732 Charles Martel vanquished the Mohammedans somewhere between Poitiers and Tours. The battle between French and English in 1356 is described below.

Poitiers, BATTLE OF. English victory over the French during the Hundred Years' War, Sept. 19, 1356. Edward, the Black Prince, in command of some 8,000 men, was marching up from Guienne, where he had landed the previous year, when, near Poitiers, he found his way barred by a French army of 15,000 under King John. Attempts at peace having failed, the battle opened with a French attack made by the dismounted knights of one of four divisions. The English archers, skilfully placed behind hedges, met them with a flight of arrows, and they failed utterly. The next assault made more impression, but these knights, too, had to give way after a stout exchange of blows. The third division thereupon fled from the field, but the fourth, under the king himself, advanced, and the English were hard pressed when the Black Prince sent a small body to the rear of this force; this move decided the day. The French knights fought to the last, but by night the army was routed. John, his son Philip, and some 2,000 knights were made prisoners, while about 3,000 were killed. The English losses were slight. The actual site of the battle is said to be some 6 m. S.E. of Poitiers, at Maupertuis. It is described by the English chronicler, Geoffrey le Baker, and by Froissart.

Poitou. Prov. of France before the Revolution. It lay between the Loire and the Garonne, around Poitiers, its capital. From the 9th century it was ruled by the counts of Poitiers, who later became dukes of Aquitaine (*q.v.*), of which it formed part. It was divided into lower and upper Poitou. Apart from Poitiers its chief towns were Mirebeau, Loudun, Niort, Luçon, Maillezais, Thouars, and Roche-sur-Yon. Since the Revolution it has been divided into the departments of Vendée, Deux-Sèvres, and Vienne, stretching also into Charente and Charente-Inférieure.

Poke. Scots word for a home-made bag of paper. It is formed from a square sheet folded in the

form of a cone and twisted at the end to prevent unrolling. Pokes are mostly used for holding small quantities of tea or sweets. A poke bonnet, a woman's hat popular in the 19th century, took its name from its resemblance to the paper bag; with a deep projecting brim, it is sometimes called a scuttle bonnet. Poke means bag in the phrase, a pig in a poke.

Poker. Card game. Various sources of origin have been claimed for it, the most authentic being that a species of poker played with 20 cards made its appearance in America on the Mississippi steamboats about 1830. This was superseded from 1860 by the now prevalent draw poker, described here. Another variety is stud poker.

In the usual game a full pack of cards is used; some players like to include the joker, which may stand for any card the holder chooses. Cards bear their usual face value, except that the ace may count as either highest or lowest. Five or six players make the best number. The dealer shuffles and makes up the pack, which is cut by the player on his right; he then deals five cards to each person, any way he pleases except five at a time. Every player is for himself, and the object of the game is to hold the best hand when all the players remaining in expose their cards after betting.

Hands rank in this order: 1. Straight flush: a sequence of five cards all of the same suit. 2. Fours: four cards of the same denomination. 3. Full house: three cards and two cards of the same denominations. 4. Flush: five cards of the same suit. 5. Straight: five cards of different suits, but all in sequence. 6. Threes: three cards of the same denomination. 7. Two pairs. 8. One pair. If two players should each hold a sequence or pair, the one having the higher cards would win. This rule applies all the way down, so that if none of these eight combinations is held, the highest card decides the winner. Hands equal in all respects divide the pool.

Before the deal is completed the player at the dealer's left, styled the age, puts up half the stake he is willing to risk, called the blind. The next player looks at his cards, and if he considers them good enough to come in, doubles the blind; otherwise he throws down his cards and goes out. This

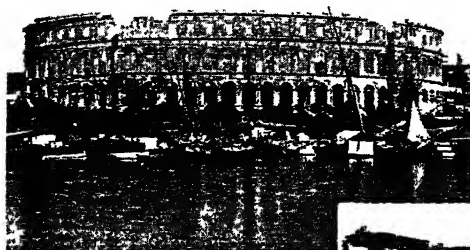
continues with the other players until it comes to the turn of the age, who must either double his blind and play, or drop out and lose the amount of his blind.

Any player who has staked money and remained in the game is entitled to ask for one to five cards more to replace any of his original hand. The real betting now starts, each player going above the other according to the strength of his hand and judgement of the chances, or equalling the previous highest bet. This continues until all players give way except one, in which event the cards are thrown in; or until all have paid equally to see one hand, whereupon all cards are laid upon the table, the holder of the highest taking the pool. Poker has been held to be a game of chance and so unlawful if played at a gaming house.

POKER DICE. Five dice are thrown, the sides being marked ace, king, queen, jack, ten, and nine. The player throwing first may make one, two, or three attempts, after which all other players are allowed the same number. Dice which show satisfactory numbers after the first or second throw are retained by the player as part of his "hand." Combinations to be tried for are five of a kind, four of a kind, full house, straight, threes, two pairs, pair.

POKER PATIENCE. In this card game for one, the player lays out the top 25 cards of the pack, singly as they come, in a square of five cards each way; each card must touch vertically, horizontally, or diagonally, one already placed. The aim is to make up the best possible poker hands in each direction vertically and horizontally, ten in all. A straight flush counts 30; fours, 16; straight, 12; full house, 10; threes, 6; flush, 5; two pairs, 3; pair, 1.

Poker-work. Method of decoration. An alternative name is pyrography (Gr. *pyr*, fire; *grapho*, to write). Formerly a red-hot poker with a sharp point was used, and the design, after being drawn on wood, was burnt in, but this method was later abandoned in favour of electrical and other methods. A special apparatus consists of a lamp, with a tube and hand bellows, and a metal point, held in the flame till heated. Cedar, chestnut, pear, elm, and other woods are usually chosen, and leather, velvet, and other materials can be decorated. Repeated designs are often burnt by



metal dies or brands; the designs may be embellished by carving and painting.

Pokeweed (*Phytolacca decandra*), PIGEON-BERRY OR RED-INK PLANT. Perennial herb of the family Phytolaccaceae. It is a native of the warmer parts of N. America. It has large, fleshy, poisonous roots, and tall stems. The large, oval, alternate leaves become purple in autumn. The whole plant has an unpleasant odour. The root is emetic and purging, and a tincture of the berries is used as a remedy for rheumatism.



Pokeweed, or the red-ink plant. Flower spikes and leaves; inset, single flower

Pokomo OR WAPOKOMO. Primitive negroid people of Bantu speech. In Tanaland territory, Kenya Colony, they number about 18,000. See Bantu; Negro.

Pokuna. Artificial tank for bathing or holding drinking water, in ancient Ceylon. Innumerable at Anuradhapura, many are 150 ft. by 60 ft., and 25 ft. deep, with granite tiers, balustraded marble steps, and sculptural enrichments. They were used for ablutions and general water supply.

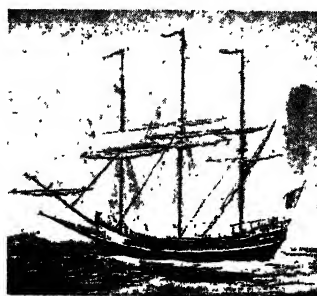
Pola (Yugoslav, Pula). Town of Yugoslavia, in Istria. It was before the First Great War the chief naval station of Austria-Hungary. There are two harbours, commercial and naval. E. of the commercial harbour are barracks, the custom house, and the 15th

century cathedral; farther E. is the wall-encircled Castle Hill, crowned by a castle built by the Venetians. A temple of Augustus, built 19 B.C., and the amphitheatre, 435 ft. long, constructed



Pola, Yugoslavia. Ruins of the Roman Temple of Augustus. Top, left, the amphitheatre from the port

of white Istrian limestone, are monuments of the Romans. The Venetians removed the stone seats



Polacca. Three-masted square-rigged vessel employed in the Mediterranean

of the amphitheatre for building purposes. As Colonia Pietas Julia, the port was an important Roman naval station; captured by the Venetians in 1148, it was destroyed in 1379; in 1815 it became Austrian. After the First Great War it passed to Italy; but under the peace treaty with Italy, 1947, the part of Venezia Giulia which included Pola went to Yugoslavia, when nearly 25,000 Italians left the city.

Polacca. Three-masted ship seen in the Mediterranean. Though square-rigged and carrying a jib-boom, the main and fore masts are single spars, without top or crossrees. The name is Italian, meaning Polish. It is also a name for the Polonaise (q.v.).

POLAND: KINGDOM AND REPUBLIC

Simon Wolf, LL.D. (Vienna)

The history of the varying area which has been called Poland is here told, followed by an account of the political conditions of the area under Polish administration after the Second Great War. See also entries under the principal towns, rivers, etc., e.g. Cracow; Tatra Mts.; Vistula; Warsaw; outstanding Polish personalities, e.g. Copernicus; John III; Paderevski; Poniatowski; Sikorski; and Russo-German Campaigns, 1941-45

HISTORY. Gniezno, oldest Polish town and cradle of the Polish nation, was, according to legend,



Poland arms

built by Lech, while his brothers, Czech and Russ, were founders of the Czech and Russian nations respectively, implying that Poles, Czechs, and Russians spring from the same stock. In old Polish the word *gniezno* meant nest. Lech so named the town because he found there a nest of white eagles, and the white eagle thus became the emblem of Poland.

Second oldest Polish town is Cracow on the Vistula. According to another legend, the ancient settlement, while ruled by Krakus, was often attacked by a dragon (more probably by a raiding enemy

tribe). Krakus killed the "dragon," and the grateful Cracovians erected a mound in his honour. Begun in prehistoric days, this mound has grown through the centuries and now dominates the city. Another mound was built in honour of Princess Wanda, daughter of Krakus. Rydygier, a German chieftain, threatened to invade Cracow unless she agreed to marry him. Wanda threw herself into the waters of the Vistula and so perished.

In the 7th century, Popiel, a descendant of the legendary Lech, ruled the third oldest Polish town,

Kruszwica. Not far from that town lived a wheelwright, Piast by name. After Popiel's death, in 842, Piast



Poland Flag; white and red



was elected his successor. This year marks the beginning of Poland's recorded history.

Mieciślaw I (Mieszko I), grandson of Piast, was christened in 966. Through him the country became Christian, and since then Poland has been in the orbit of western civilization. Mieciślaw's son, Bolesław the Valiant, was crowned first king of Poland in 1025. He extended the frontiers of the country eastwards as far as Kiev. When entering that city—then the richest in Europe—he chipped his sword in striking Kiev's golden gate. This jagged sword was used as the coronation sword of all Polish kings. Bolesław, who stopped the Teutonic advance to the E., is regarded as the real founder of the Polish state.

During the 11th century Poland grew in size and power. At the beginning of the 12th the Slav tribe of Pomeranians was converted to Christianity, and their land, stretching from Szczecin (Stettin) to Gdańsk (Danzig), was united with Poland, thus bringing her to the Baltic coast. But at the same time Poland was divided into several principalities. During that period of division the country was threatened by two great dangers. The first was the Tartar invasion. Henry the Pious, duke of Silesia and a descendant of Piast, fought the Tartars at Liegnitz (Lignice), in Silesia, and perished with all his knights in 1241. That battle saved Poland, and also her western neighbours, from the Tartars, who thereafter retreated to the E., though they kept a hold on Russia for more than 200 years.

The second peril came from the Teutonic knights of the Cross. This order, established in Palestine during the Crusades, was invited in 1226 by Conrad, duke of the Polish principality of Masovia (Masuria) in central Poland, to help convert the pagan Prussians (a non-Teutonic tribe, not identical

with the modern Prussians) to Christianity, and in order to repel their attacks on a weakened and divided Poland. In the event, however, knights of the Cross exterminated the Prussians, brought colonists from Germany, and settled

ously, union of Poland with Lithuania was arranged in 1386. The union lasted until the end of the 18th century.

After becoming king of Poland, Jagiello was provoked by the knights of the Cross into war. On the fields of Grünwald and Tannenberg, one of the most important battles in history was fought between the Polish and Lithuanian forces and the Teutonic knights, in 1410. The peace treaty of Toruń, 1466, returned to Poland all her former possessions on the Baltic coast, except E. Prussia, still held by the knights, but now under the suzerainty of the king of Poland. When the last grand master of the knights of the Cross secularised the order, he proclaimed himself hereditary duke of E. Prussia and vassal of the Polish king. East Prussia thus remained a fief of Poland until 1701.

The Jagellon dynasty ruled from 1386 to 1572, Poland's golden age, which was marked by voluntary unions not only with Lithuania, but also with Livonia, Ruthenia, and Moldavia. By the end of the 16th century, Poland was the largest state on the Continent. While religious intolerance was prevalent in nearly all Europe, in Poland there was freedom of religion; but though Protestants were given equal rights with R.C.s Protestantism never gained much influence in the country. The Polish Habeas Corpus Act, dating from 1430, stipulates that "nobody may be imprisoned before he is legally convicted." During this era science and the arts flourished.

At the extinction of the Jagellon dynasty, Poland in 1572 became a republic with kings elected for life. As in England in those days, political liberty and parliamentary government went hand in hand with weakness of the central authority. One of the ablest elected kings, the Hungarian Stefan Batory, strove in vain to strengthen the govt. He was, however, help-



Poland. Four young people of Sokolowa. Above left, peasant girls of Gosty in the district of Poznań

in what became the German prov. of E. Prussia; then they began following secular aims. They captured the Slav city of Gdańsk, 1308, and made constant raids on then pagan Lithuania.

Wladislaw the Short, one of the Piast princes, succeeded in reuniting Poland at the beginning of the 14th century, fought the knights of the Cross, and defeated them at the battle of Płowce. His son, Casimir the Great, who ascended the throne in 1333, promulgated the statute of Polish law in 1347, historically the first complete code in Europe; in 1364, he founded the university of Cracow. Jews, then persecuted in central and W. Europe, were invited by Casimir to come to Poland. They came and helped to build new cities. When Casimir the Great died, in 1370, the Piast dynasty at last came to an end.

Casimir's successor was his nephew, Louis, king of Hungary. He in turn was succeeded by Jadwiga who married the half-savage prince of Lithuania, Jagiello, who took the name of Wladislaw, and his people were voluntarily baptized. Simultan-



Poland. A meat stall in the market at Białystok



less against the *liberum veto*, the ruling by which a single member of the diet (*sejm*, in Polish) could oppose the enforcement of any law. In war, Batory was more successful: he defeated the Russian Tsar, Ivan the Terrible. Wilno university, a centre of Polish science, was founded by Batory in 1578.

In the 17th century nearly all Europe was exposed to the danger of invasion by the Turks, who besieged Vienna in 1683. The German Emperor Leopold, hard pressed by the Turks' French ally Louis XIV in the W., asked for Polish help. John III Sobieski, with 40,000 of his picked troops, defeated the Turkish army of 300,000 and saved Vienna.

This last efficient Polish king was followed by two elected rulers of the Saxon dynasty, Augustus II and Augustus III. During their reigns, Poland's strength was dim-

inishing. In 1764, the Empress Catherine of Russia imposed on Poland as a king her candidate Stanislas Augustus Poniatowski. For many years already, Russia and Prussia had been resolved to maintain a state of anarchy in Poland. To combat lawlessness and foreign intervention, Polish patriots organized a military league, the confederation of Bar, under the leadership of Casimir Pulaski, future hero of the American War of Independence. The confederation failed, and the first partition of Poland was enforced in 1772, Prussia annexing Pomorze (Pomerania) on the Baltic coast, Russia provs. in the E., Austria the S.E. section (Galicia). The shock of this partition awakened the nation in what was left of Poland. In 1773, a ministry of education—the first in the world—was created; while the constitution of May 3,

1791, which laid the foundation of a modern system of govt., while at the same time strengthening the central powers in the state, was liberal in character. May 3 became the national day of Poland.

Russia and Prussia, fearing a Polish renaissance, attacked Poland from both sides, defeated the Polish army and partitioned the country a second time in 1793. This time Prussia annexed Gdańsk and a vast tract of W. Poland, while Russia took further E. provs. Austria did not take part in the second partition.

Again a patriotic wave swept over Poland with Tadeusz Kosciuszko as its leader. Against the will of the weak puppet king, Stanislas Augustus, he summoned the nation to arms and, with his peasant fighters armed only with scythes, defeated a large Russian army at Racławice, near Cracow

In Warsaw, at the same time, the people under the leadership of the cobbler Jan Kiliński attacked the Russian garrison, and forced all the Russians out of the capital. However, on Oct. 3, 1794, Kościuszko was decisively defeated at Maciejowice, the Russians occupied Warsaw, and in 1795 occurred the third partition, which destroyed Poland as an independent country.

The Poles attempted to regain their independence during the Napoleonic wars. In Italy, Poles under Dąbrowski fought on the French side, and at that time the Polish national anthem, *Poland Is Not Yet Lost*, was written and composed. Napoleon showed his gratitude for Polish military help by creating the duchy of Warsaw, a nucleus of the Polish state, in 1807. After Napoleon's fall, the Congress of Vienna (1815) gave the major part of Poland to Russia, with the stipulation that it should be granted self-government. But the Russians treated the Poles so badly that in 1830 the November rising broke out. After its suppression, many thousands of Polish patriots emigrated—most of them to France. There Adam Mickiewicz, the greatest Polish poet, wrote his famous epic, *Pan Tadeusz*.

In 1863 the January rising occurred. It was defeated after a year of fighting, and thousands of Poles were deported to Siberia. Meanwhile, in the provs. annexed by Prussia, a process of thorough Germanisation was going on. Foreign rule in that part of Poland which had been taken by Austria was relatively liberal, Galicia eventually securing from Vienna extensive autonomy, while statesmen of Polish extraction played a role in various Austrian govts.

The Republic of 1919

It was in Galicia that a young Socialist Josef Piłsudski, after his return from Siberian prisons, founded the Polish riflemen's organization, the nucleus of the Polish legions during the First Great War, and later of the Polish army. After the war an independent Poland, one of Wilson's Fourteen Points, became a fact, recognized by the treaty of Versailles, 1919. She immediately occupied Galicia, wrested Wilno from Lithuania, and advanced into the Ukraine as far as Kiev. There her troops were held by the Red Army, which in its turn invaded Poland, to be defeated 1920 by Piłsudski. At first undisputed leader of the country, Piłsudski later had to give way to other, and more democratic, forces in the

state. In 1926, however, by a coup d'état he returned to power, introducing a semi-dictatorship which was maintained after his death in 1935.

SECOND GREAT WAR. Poland had concluded treaties of non-aggression with both Russia and Germany; but on Sept. 1, 1939, she was invaded by the Germans. That was the signal for the U.K., who had entered into a pact of military assistance with her in April, 1939, to declare war on Germany. After a gallant but short-lived resistance, the Poles were routed, and the invasion of the country from the E. by the Red army completed their defeat. Warsaw held out against the Germans until Sept. 27, but by the end of the month Poland had once more lost her independence, the country E. of a line called the Ribbentrop-Molotov line (coinciding roughly with the so-called Curzon Line, *q.v.*), being occupied by the Russians, the country W. of that line by the Germans, according to a pre-war secret treaty.

Polish Forces Abroad

A few weeks later a Polish army was being recruited in France and an exiled govt. was established in the French town of Angers. The leader of both army and govt. was Gen. Władysław Sikorski. Two Polish divs. took part in the battle of France, one in Lorraine, and the other at the Belfort gap. After the fall of Paris, June 14, 1940, Sikorski flew to London and arranged with Winston Churchill for the transfer of some 24,000 Polish troops to the U.K., where 2,300 airmen and 1,400 sailors were already serving under British command. Reconstruction of the Polish army began in Scotland, while Polish R.A.F. squadrons, particularly fighter squadrons No. 303 and No. 304, distinguished themselves in the battle of Britain. Units of the small but efficient Polish navy, after running the German gauntlet in the Baltic at the beginning of the war, became for all practical purposes a part of the Royal Navy; they participated in the Norway expedition and helped to evacuate British and French troops from Dunkirk. The Polish forces were, at that time, mostly recruited from young Poles who had fled from their country and reached the U.K. after an adventurous journey.

In Poland itself, in the meantime, the Nazi Governor Franek administered the country with an iron hand, suppressing Polish

cultural life, and conducting a policy of extermination. Worst of all was the fate of the three and a half million Polish Jews who, having been forcibly concentrated in ghettos, were condemned to death by Himmler. Not more than 100,000 escaped the gas chambers and crematoriums of the death factories at Oswiecim (Auschwitz), Tremblinka, and Belzec. Moreover, the Germans transferred Jews from all over occupied Europe to Poland, where altogether about 5 million met their death. Before the final liquidation, April 28, 1943, of the Warsaw ghetto—the largest of all—a handful of young Jews of both sexes, armed with nothing but their fists and a few machine guns and rifles smuggled in by the Polish underground movement (*v.i.*), for ten days fought their oppressors, killing 300 Germans and wounding 1,000. A few Jews escaped through the sewers; 26,000 were massacred; some 14,000 survivors were deported.

After Germany attacked Russia, the E. part of Poland was soon also occupied by the advancing Germans, and the Nazi policy of oppression and extermination extended to those territories. The Poles, unable to fight the invader openly, established a very effective underground movement, led and inspired by the Polish govt. in London. The commander of the secret army in Poland was first Gen. Rowecki and, after his arrest and execution by the Gestapo, Gen. Bor-Komorowski, who was also commander of the Warsaw rising of 1944 (*see* Warsaw). In 1944, there were 300,000 men and women in the underground army; it ran many daily and weekly papers and other publications.

Poland and the U.S.S.R.

After the invasion of E. Poland by Russia the Poles had no contact with Moscow until in July, 1941, Sikorski went to Moscow and concluded a treaty of friendship and assistance between Poland and Russia which annulled the Ribbentrop-Molotov partition of Poland and provided for the formation of a Polish army in Russia, to be recruited from the deported Poles and the Polish prisoners of war captured by the Red army during the short campaign of Sept., 1939. A corps was raised under Gen. Władysław Anders, but difficulties arising as to its arming and use, the U.K. undertook to equip it. The corps left Russia, was reorganized in

Persia, and then joined the British Middle East forces, serving eventually in Libya and Italy, where it particularly distinguished itself at Cassino (*q.v.*). A Polish armoured div., raised in the U.K., fought in Western Europe 1944-45. A total of about a quarter of a million Poles served outside Poland under British command with the Allied forces.

Sikorski's death in an aeroplane accident in July, 1943, marked the end of good relations between Russia and the Polish exiled govt., which resisted the Russian proposal, made as the Red army was approaching the pre-war Polish frontier in 1944, that Poland should revert to the E. frontier proposed in 1919 (the Curzon line), and should receive compensation in the W. at the expense of Germany. The Russians took Lublin on July 24 and there set up as a national liberation committee, to which they transferred administration of Polish territory as it was liberated, the association of Polish patriots formed earlier in Moscow. On Dec. 31 this committee declared itself the provisional govt. of Poland, and was so recognized by the U.S.S.R. on Jan. 5, 1945.

At the conference in the Crimea, held at Yalta in Feb., the U.K. and the U.S.A. agreed provisionally to withdraw recognition from the exiled govt. and to recognize the Lublin administration provided the latter were broadened by the inclusion of democratic leaders from within Poland and from abroad, and subject to the holding of free elections; accepted the Curzon line, with slight modifications, as the eastern frontier of Poland; and agreed to her acquisition of territory from Germany in the N. and W.

New Government and Boundaries

The Polish govt. in London, which had not been consulted about these decisions, refused to accept them; and inter-Allied consultation on the formation of a new and more representative govt. in Poland made little headway until in June a meeting in Moscow between Mikolajczyk, who had succeeded Sikorski as premier in London, but had resigned from the London govt. Oct., 1944, and members of the (Lublin) govt. in Poland agreed on the formation of a new govt. in Warsaw in which Mikolajczyk became vice-premier. Recognition by the U.K. and the U.S.A. followed July 5. Mikolajczyk's Peasant party was soon obliterated, however, and in 1947 he fled the country.

At the Potsdam conference, July-Aug., 1945, it was agreed that Germany between the Oder-Neisse rivers and the pre-war Polish W. frontier, as well as the S. part of E. Prussia, should be placed under Polish administration, subject to ratification in the peace treaty with Germany; while a treaty between Poland and Russia, signed Aug. 16 and ratified Jan. 3, 1946, settled Poland's E. frontier along the Curzon line with modifications in favour of Poland. For later history, see N.V.

GEOGRAPHY. The entity called Poland has had varying dimensions. Poland has a natural frontier only in the S., that formed by the Carpathian and Tatra mts. The accompanying map shows (1) her frontiers in 1939, and (2) the frontiers of the area under Polish administration in Aug., 1945. This second area, which is about one-fifth smaller than that of 1939, is 119,702 sq. m. in extent, with a pop. (1946) of 23,911,172.

The most important Polish river is the Vistula, on whose banks Warsaw, the capital, and Cracow, a former capital, are situated. The cradle of the Polish nation, however, lies in the basin of the river Warta, a trib. of the Oder. The Niemen, no longer in Poland, figures in Polish poetry.

A Peasant Population

Before the Second Great War, about two-thirds of Poland's pop. of 34 million lived in rural districts; after it, although the inclusion of industrial areas, in particular Silesia, changed the proportions of town and country dwellers, peasants still formed the majority. The post-war land reform of 1946 expropriated big landowners and distributed their land among peasants. Poland is also a country of big forests, timber being an important export.

In 1939 Poland had large minorities: 4,780,000 Ukrainians, nearly 3,500,000 Jews, 630,000 Germans, 1,500,000 White Ruthenians, 90,000 Lithuanians; and a small Czech minority in the S.W. There were hardly any minorities in the Poland of 1946; the Jews had been exterminated, the Germans expelled, and the Ukrainians, White Ruthenians, and Lithuanians absorbed in the U.S.S.R.

For administrative purposes, the country is divided into counties, called *województwa*. Warsaw, the largest Polish city (1946, 476,538), had in 1937 1,261,000 inhabitants. Other important towns are Lodz, the Polish Manchester, 496,861; Cracow, 299,565; Poznan, 267,962;

Bydgoszcz, 133,856; Katowice, 128,278; Czestochowa, 101,480; Wroclaw (Breslau), 168,466; Gdansk (Danzig), 117,616; Chorzów, 103,417.

With the inclusion of Upper Silesia in the country, Poland became an important coal producer. The salt mines at Wieliczka, near Cracow, are famous. In the Middle Ages there were silver mines at Olkusz. Other mineral deposits in Poland are: potash salts, iron ores, zinc, lead. Water power is extensively used, particularly in the S.W. Poland has, however, a low standard of living and of consumption, particularly in regard to industrial products.

CONSTITUTION. Poland was revived in 1918 as a republic. An interim constitution, adopted in 1947, divided power between the legislative chamber (*sejm*), which is elected, the executive, and the president, who is elected for seven years by the *sejm*. The *sejm* must be summoned twice a year, and controls taxation and conscription.

Through the centuries, in spite of changing rulers and forms of govt. the peasants of Poland preserved many of their traditional customs and costumes. The prov. of Lowicz was famous for the multi-coloured hand-woven dresses of the women. At weddings in the villages around Cracow young men on horseback seized the bride and carried her to church. The costumes, dances, and songs of the mountaineers in the Polish Tatra, who were never serfs and who, like the Scottish highlanders, play bagpipes, were striking. Poland is predominantly R.C., and R.C. customs were strictly observed. At Warsaw and Cracow a custom of throwing wreaths into the Vistula, dating from pagan days, continued to be celebrated.

Famous Poles of History

Poles not mentioned already who have achieved world fame include Copernicus (1473-1543), one of the founders of modern astronomy; Chopin (1810-1849), the composer; Prince Joseph Poniatowski (1762-1813), one of Napoleon's marshals; Sienkiewicz, (1846-1916) and Reymont (1868-1925), novelists and both winners of the Nobel prize for literature; Marie Curie (Skłodowska) (1867-1934), co-discoverer of radium and co-winner of the Nobel prize for physics, 1903, winner of the Nobel prize for chemistry, 1911; Conrad (Korzeniowski) (1857-1924), distinguished writer in English; Paderewski (1860-1941), pianist and politician.

Despite the geographical distance between Poland and the British Isles, certain bonds have existed between the two countries. About the middle of the 11th century Aaron, a Scotsman, was archbishop of Cracow. At the time of the English reformation, many English R.C.s found refuge in Poland. The Polish theologian, Jan Laski, founded in London, in the middle of the 16th century, the first Protestant community of foreigners in England. From the 15th century to the partitions, England imported from Poland pitch, grain, and timber, and sold in return textiles and other manufactured goods. When the first partition took place, the British govt. decided neither to recognize the aggression nor to protest against it; but Burke condemned it.

An agreement between England and Poland, 1708, provided facilities for English merchants in Gdańsk, where, by the year 1772, they owned nine warehouses; 220 ships from England reached Gdańsk every year. When Prussia annexed Gdańsk, the City of London protested, for German violence was destroying trade with Poland. The duke of York, second son of George III, was mentioned as a candidate for the throne of Poland.

Simon Wolf

Bibliography. The Partition of Poland, Lord Eversley, 1915; Poland Past and Present, J. H. Harley, 1917; Towns and People of Modern Poland, R. M. McBride, 1933; Cambridge History of Poland, ed. Reddaway, Pensar, Halecki, and Dybowski, 1940; Poland and the Baltic, H. Baginski, 1942; Outline of Polish History, O. Gorka, 1942; History of Poland, O. Halecki, 1942; Life and Culture of Poland, W. Lednicki, 1944; Poland between Two Wars, F. Zweig, 1944; Social Legislation in Poland, J. Block, 1944.

LANGUAGE AND LITERATURE. Forming with Bohemian or Czech and Wendish the western group of the Slavonic languages, Polish is spoken by 20-25 million people. In flexibility, variety, and power, Polish rivals Russian. The Cyrillic alphabet, however, serves Russian better than the Roman does Polish, inasmuch as it can indicate the sounds of Slav words by combinations of appropriate letters. The disability of the Roman to do this results in that collocation of consonants which seems so intimidating in Polish, till it is explained that sz=sh, cz=ch, and rz=zh or sh; e.g. Pszybiszewski is pronounced Pshybishew(v)ski.

Polish literature is extensive, and much of it is high in quality. It has had a marked influence on Russian, Czech, Serbian, and Ruthenian literatures. The earliest extant Polish works were written in Latin, and consisted of monastic chronicles similar to those found in other European countries at the time, the principal being the Chronicle of Martin Gallus (d. c. 1140). The foundation of the university of Cracow, 1364, led to an increase in learning. The first printing press in Poland was set up in Cracow in 1475, but Latin was still used, and the first book to be written in the Polish language did not appear till 1521.

Meanwhile the Renaissance, with its humanism, had enlarged the horizon of the Poles, and in the 16th century brought about what is sometimes called the golden age of Polish literature and the growing use of the vernacular. Of the writers of this time Kochanowski was the greatest, both as poet and dramatist. Polish literature declined in the 17th century, owing to wars and internal troubles.

The rise of the romantic school of Polish authors dates from about 1820. This school produced one writer of genius, and two of remarkable talent. The first was Adam Mickiewicz (q.v.); the others were Jules Slowacki (1809-1849), poet and dramatist, his most notable work being *King Mind*, and Zygmunt Krasinski (1812-1859), poet and thinker, whose chief work, *The Undivine Comedy*, deals with the sufferings of his unfortunate land. A prolific author was Joseph Ignatius Kraszewski (1812-1887), historian, poet, dramatist, publicist, and novelist, his works actually exceeding 600 vols. in number. Of the many modern writers of merit Poland has produced, the commanding figure was that of Henryk Sienkiewicz (q.v.), a novelist of the highest rank. Other men of note were Milkowski, a vivid stylist who wrote novels about the Balkans; Korzeniowski, a dramatist of real life; Alexander Glowacki, a humorist of the type of Dickens; Pszybiszewski, a playwright of originality, whose *Homo Sapiens* made a great sensation; and Tetmajer, author of the novel, *Angel of Death*. Followers of Sienkiewicz were Stefan Zeromski (1864-1935) and Wladislaw Reymont (1867-1925), author of a fine psychological tetralogy translated into English under the title *The Peasants*. The greatest poet of the late 19th century was Jan Kas-prowicz (b. 1860).

Polar Axis. Term in astronomy relating to the mounting of a telescope so that it is directed towards the celestial pole. The term also applies in mineralogy to a crystal having different arrangements of faces at its two ends. Minerals with a polar axis are tourmaline and diopase.

Polar Bear (*Thalassarcus maritimus*). Apart from the grizzly (q.v.), this is the largest member of the bear family (*Ursidae*). It is white in colour, and sometimes over 9 ft. long. It occurs in the Arctic regions, feeding on fish and seals. *See Bear*; *Carnivora*.

Polar Day. Period of nearly six months' continuous daylight during the summer season at the N. or S. pole. As the earth travels round the sun in an elliptical orbit, it is not upright but tilted at an angle. Hence at one period the N. Pole and surrounding region are inclined towards the sun, and as the earth revolves on its axis they remain in the sun's light; simultaneously the S. Pole and surrounding region are tilted away from the sun and receive no light at all. Six months later the position is reversed.

Polar Exploration. General term for the early voyages of discovery in the Polar regions of the Arctic and Antarctic Oceans and for the later attempts to reach the North and South Poles. *See Antarctic Exploration*; *Arctic Exploration*.

Polaris. Name given to Alpha Ursae Minoris or the pole star, the nearest star to the North Pole of the heavens. *See Pole Star*.

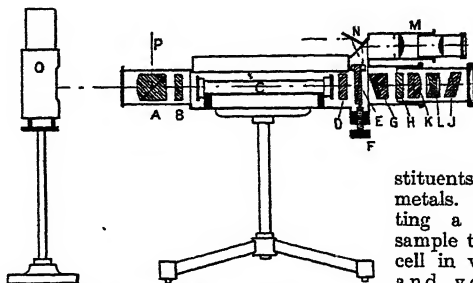
Polarisation of Light. An ordinary ray of light may be thought of as an axis, about which very small electro-magnetic vibrations are being executed at an exceedingly rapid rate, and in every possible direction perpendicular to that of the ray. Thus, in the case of a vertical ray of ordinary light the vibrations are all horizontal, but may be directed to any point of the compass. The polarisation of light involves the reduction of these haphazard, disorderly vibrations to a more regular system.

The simplest type of polarisation is "plane polarisation," in which all the vibrations along the ray are in the same plane; in the case of a vertical ray of plane polarised light the vibrations would all be horizontal and all in a given direction, e.g. the N.-S. direction. A ray of light may also be circularly polarised, in which case the vibrations are executed in circles about the axis of the ray.

The phenomenon of polarisation may be obtained very simply by passing an ordinary ray of light through a crystal of tourmaline or Iceland spar. Plane polarised light is also obtained in the light reflected from a glass mirror at an angle of about 55° ; this is a particular instance of Brewster's law, in that the reflected beam is completely polarised when it is normal to the refracted ray. One of the most remarkable properties of light, clearly showing its electro-magnetic nature, is the fact that the plane of polarisation can be rotated by the presence of a strong magnetic field. The passage of the ray through certain substances, such as quartz and various solutions, also causes a rotation of the plane of polarisation. Instruments for measuring this rotation are called polarimeters, and they are used for determining the strength of sugar solutions, etc. In 1809 Arago found that part of the light from nearly all points in a blue sky is plane polarised. The phenomena of sky polarisation are attributed to the scattering of light by gas molecules and fine dust particles in the atmosphere. Such polarisation is most marked in the light coming in the region in the solar vertical at 90° from the sun; about two-thirds of the wave-motion is confined to the plane containing the sun, the observed point, and the observer. At three points in the solar vertical are three small regions, the light from which is unpolarised. The position of these three neutral points depends on the sun's altitude, the wavelength of the examined light, and the weather conditions. See Crystallography; Light; Optics.

Polariscope. Optical instrument for exhibiting the properties of polarised light. It consists essentially of two parts, the polariser and the analyser, of which the first isolates the polarised beam, while the second enables us to observe its properties. The instrument may take various forms, according as the light is polarised by passage through a crystal or by reflection. The figure shows diagrammatically a standard polariscope. A is the polariser, B and D quartz disks, C glass tube with brass ends, in which is placed the solution being examined. The two quartz plates, E, can slide over one another, a screw and wheel, F, making the necessary adjustment. G is a Nicol prism, H and J regulator quartz plate and prism respectively. K and L are lenses, M a small telescope to enable readings

to be taken from the vernier scale on the movable half of E. N reflects light on the scale, while O is a lamp for providing light rays into the polariscope. P is the ordinary reflected ray of light, the



Polariscope. Diagrams of a standard instrument seen in section. See text

polarised ray passing through the solution in C. A few number of parts are often used. See Polarisation of Light.

Polar Medal. British award for expeditions to the Arctic and Antarctic. The first was issued in 1857 to all personnel, or their next of kin, who had taken part in expeditions between 1818 and 1855. A second medal issued in 1876 to personnel of the Alert and Discovery Arctic expeditions was circular with the effigy of Queen Victoria on the obverse and on the reverse a ship in pack ice.

In 1904 Edward VII authorised the present Polar Medal. It is octagonal and has on the obverse the effigy of the sovereign in naval uniform and on the reverse the Discovery in winter quarters, with a sledge party. The medal is suspended from a white watered silk ribbon attached to a scroll clasp. It was first issued to members of Scott's Antarctic expedition of 1901-04, personnel of the Discovery receiving the medal in silver with a bar "Antarctic 1901-1904," and the crews of the relief ships Morning and Terra Nova the medal in bronze. The medal with appropriate bar was given for Shackleton's Antarctic expedition of 1907; Scott's, 1910-13; Mawson's, 1912; and the Shackleton trans-Antarctic expedition of 1914-16. Medals with bars, Arctic 1930-31, Antarctic 1929-31, Antarctic 1930-31, Antarctic 1935-37, were given after expeditions in those years, and in bronze to the crews of the research ships William Scoresby and Discovery II, 1925-39. The silver medal was awarded in 1943 to eight members of the Royal Canadian Mounted

Police for the voyage through the N.W. passage in the schooner St. Roch. The silver and bronze medals may be worn simultaneously.

Polarographic Analysis.

In metallurgy, the name given to a system of analysis employed in industrial and research laboratories for the rapid determination of

constituents of alloys and pure metals. It involves putting a solution of the sample to electrolysis in a cell in which the current and voltage can be measured simultaneously, during a steady increase of voltage. The cathode

of the cell is a fine column of dropping mercury; the anode may be either a pool of mercury at the bottom or an external anode of known potential. The electrolyte is a dilute solution of the sample with an added supporting electrolyte, which raises the conductivity of the solution and carries most of the current. The instrument is arranged so that the cell current may be plotted on a graph against the voltage.

The cathode is made by introducing mercury through a fine capillary tube under a constant head, so that a series of fine drops of mercury is formed, each drop eventually reaching the bottom of the cell. When the voltage is low, the current is small and the current/voltage curve nearly horizontal; but as the voltage is increased, a stage is reached at which the cations of one of the metals present start to be deposited, causing a rapid increase in the current. The current reaches a limiting value and the current/voltage curve again becomes nearly horizontal. The final curve is thus roughly S-shaped. The height of this polarographic wave is proportional to the amount present of the cation which causes it, and hence to the amount of the particular metal present. Also the voltage of the mid-point of the steep part of the wave, known as half-wave potential, is characteristic of the particular metallic cation. It is often possible to determine several elements in the same solution. See Assaying.

Polar Regions. Term used to designate the areas which surround the earth's geographical poles. They are limited by the

Arctic and Antarctic circles. At the spring equinox, in March, the North Pole begins its "day," which lasts for half a year until the autumnal equinox in Sept. On midsummer day, in June, there is no sunset visible anywhere within the Arctic circle. Between the Arctic circle and the North Pole there are periods without a single sunset between 24 hours and six months; the nearer the pole, the longer the period. Whatever is happening in the N., the exact opposite occurs at the antipodes in the South Polar regions; for when the N. is tilted towards the sun, the S. is tilted away to the same extent. See Antarctica; Arctic Circle.

Polder (Dutch). Name given to a low-lying area of the Netherlands which has been reclaimed from the sea. Used mainly for pasture, some polders have been developed for the growing of bulbs and vegetables. See Netherlands.

Poldhu. Cove and headland of Cornwall, England. It is about 6 m. N.W. of The Lizard. From Poldhu Marconi sent the first experimental trans-Atlantic radio messages in 1901; successful short-wave tests were made also between Poldhu and Sydney, N.S.W.

Pole. In geography, one of the two terminal points of the earth's axis. In astronomy the celestial poles are those points in the heavens to which the earth's axis is directed. The poles of the horizon are called the zenith and the nadir points. See Magnetism, Terrestrial.

Pole. Term used in magnetism and electrical engineering. In a bar magnet the poles are the regions near the end from which the lines of force appear to emanate. In a freely suspended magnet the end pointing to the N. pole of the earth is known as the N-seeking or N. pole. The N. and S. poles are often respectively designated the positive and negative poles.

Pole. Measure of length, also known as the rod or perch. It is $5\frac{1}{2}$ yds. long. A square pole covers $30\frac{1}{4}$ sq. yds.

Pole. Name of an English family famous for its nearness to the crown in the 15th and early 16th centuries. It was founded by a Yorkshireman, William atte Pole, who settled in Hull about 1300.

Sir William atte Pole, the younger, who lent money to the government, and was a member of Edward III's parliaments, was the father of Michael Pole, who was made chancellor of England and earl of Suffolk. He, too, was

wealthy, but had many enemies, and after an impeachment his friend, Richard II, was obliged to abandon him, and he died in France in 1389. A son, restored to the earldom, died before Harfleur in 1415, and the next earl was killed at Agincourt. William Pole, or de la Pole, as the family is often called, became the 4th earl, and was later that duke of Suffolk so prominent during the earlier part of Henry VI's reign. He, too, lost his honours and estates before he died, but the dukedom was restored to his son John in 1455. (See Suffolk, Duke of.)

This John Pole, the 2nd duke, married Elizabeth, daughter of Richard, duke of York, and sister of Edward IV, and they had several sons to whom this relationship proved fatal. The eldest, John, earl of Lincoln, regarded at one time by Edward as heir to the throne, rebelled with Simnel against Henry VII, and was killed at Stoke. The second, Edmund, who succeeded his father in the earldom but not in the dukedom of Suffolk, handed over to Henry VII by Philip, the archduke, was put to death in 1513. Another son, Richard, killed at Pavia in 1525, was the last male of the house.

Pole, REGINALD (1500-58). English cardinal. He was born in March, 1500, at Stourton Castle,



Reginald Pole

Titian

Staffs, son of Sir Richard Pole and Margaret, countess of Salisbury. Reginald entered the Church, retired from England to Italy in 1532, definitely broke with Henry VIII in 1535 on the question of his divorce, and was made a cardinal in 1536. During the reign of Henry and the Protestant government under his successor, Edward VI, Pole could not venture to England; but on the accession of Mary (1553) he was sent to England as papal legate to effect the formal reconciliation of England with Rome. Arriving Nov. 25, 1554, he immediately became Mary's most trusted confidant, and was elevated to the vacant see of Canterbury. He died Nov. 17, 1558, the same day as the queen. Consult Life, by F. A. Gasquet, 1927.

Pole-axe. Military weapon used up to the 16th century by mounted soldiers. It consisted of

a hatchet blade, and serrated hammer, on a short handle, and was a later form of the battle-axe (*q.v.*). A more modern form of pole-axe was used for slaughtering cattle, but during the 20th century it gave way to more humane methods. See Armour.

Polecat (*Mustela putorius*). British carnivorous mammal, belonging to the weasel tribe. It is



Polecat, small savage mammal found in parts of Britain
W. S. Berridge, F.Z.S.

about 17 ins. in length and has a short bushy tail. The general colour of the fur is blackish brown, the under-fur being yellowish brown; the legs are black, the rims of the ears and the lips white, and there is a bluish-grey band across the forehead. The animal makes its home in deserted rabbit holes, old buildings, and crevices in rocks; preys upon small mammals and birds, frogs, reptiles, and eggs; and is very ferocious in disposition, often killing for mere sport. The polecat breeds in May. See Ferret.

Pole-Finder. In electricity, an apparatus indicating the positive and negative poles of a chemical cell, dynamo, or other source of D.C. Any kind of moving-coil volt meter will act as a pole-finder, as the pointer will be deflected over the scale of the instrument only when the terminals are correctly connected. A galvanometer can be used similarly. Polarity can also be determined electrolytically. When leads from a source of D.C. are brought into contact with moistened pole-finding paper a change in colour is produced at one or other of the poles according to the chemical used in the paper.

Polemoniaceae. A family of annual and perennial herbs (a few shrubs), natives of cold and temperate regions. They have tubular, or bell-shaped, showy flowers. The order includes the genera *Polemonium* (Jacob's ladder), *Phlox*, *Gilia* and *Collomia*.

Polenta (Ital.). Favourite food in Italy. It is maize meal made into porridge, and when served hot eaten with milk and salt or sugar. When cold, it is cut into slices, powdered with grated cheese, and

fried. This dish is a favourite with Americans as well as Italians.

Polesden Lacey. Estate of about 1,000 acres near Ranmore Common, Surrey, England. It belonged to R. B. Sheridan, and as the home of Mrs. Ronald Greville became famous during the Edwardian period for social entertainments. King George VI and Queen Elizabeth when duke and duchess of York spent part of their honeymoon here in 1923. Mrs. Greville, who died 1942, left

house and estate to the National Trust.

Pole Star. Nearest conspicuous star to the N. Pole in the sky. It is at present a second magnitude star forming alpha in the constellation of Ursa Minor. It is easily found by following up the line joining the stars alpha and beta, or the pointers of the Great Bear. Owing to precession (*q.v.*) the pole star was Alpha Draconis about 4,500 years ago, and will be Vega in 12,000 years' time.

POLICE: PRESERVERS OF LAW & ORDER

David Le Roi and a Legal Authority

Here is an account of the origin and development of police forces in Great Britain, together with some account of their duties and training, and particularly of similar forces in other countries. See illus. facing p. 6549. See also Scotland Yard

The police (*Fr.*, from *Lat. politia*, civil government or condition of a state) of a country form its system of judicial and executive administration, especially the enforcing of that country's system or policy for the maintenance of social order and the security of life and property. Originally the term was restricted to its judicial meaning, but is now more generally applied to a civil force organized and maintained for the prevention and detection of crime, the preservation of public peace and order, and the general enforcement of national laws and the by-laws and regulations of a city, borough, or district.

From the earliest times most countries have had police forces, but at first their functions were more concerned with the maintenance of political power.

Such police forces were, in effect, internal secret services, and in that sphere reached high efficiency in the 17th, 18th, and early 19th centuries, notably in Russia, Spain, and France. On the other hand, there was little organized deterrence to common crime, and those countries with efficient political police were generally the most lawless. A political police remains essential to a dictatorship; Nazi Germany had its Gestapo (*q.v.*) and Soviet Russia its OGPU (*q.v.*) to detect and prevent opposition to its regime.

Early English Police

Except under the Elizabethan and Commonwealth administrations, political police were seldom employed in England, but neither was there any organized force specifically charged with the enforcement of the common law until the 19th century. Anglo-Saxon police arrangements were based primarily on the principle of mutual responsibility. When a man committed a crime, his rela-

tives were responsible for his apprehension; this was later extended into the Frankpledge system of Alfred the Great. Each county was divided into hundreds and each hundred into tithings. A tithing consisted of ten freemen mutually responsible for the good behaviour of each other. This system continued under the Normans, though the actual arrest of criminals was delegated to the king's troops.

Statute of Winchester

By the Statute of Winchester, 1285, security of life and property was made dependent upon three regulations: Assize at Arms, Watch and Ward, and Hue and Cry. Assize at Arms required every able-bodied man between 16 and 60 to be armed and at the disposal of the judicial power. In all towns and populous districts between sunset and sunrise twelve armed citizens patrolled the streets and apprehended any suspicious character. This was Watch and Ward. Hue and Cry was raised if a suspect attempted to escape the patrol, to chase him to the district boundaries, where the chase was taken up by other districts until he was arrested or driven to sanctuary. The crown appointed to each town and parish a constable, to ensure that patrols were properly armed and organized.

After some centuries the custom arose of employing full-time substitutes for Watch and Ward obligations. As few citizens were prepared to pay the wages of able-bodied deputies, the office of watch-and-ward-man, or watchman, was often filled by men too old and feeble for their task.

At the end of the 18th century, high constables and parish constables in rural districts and provincial towns were authorised, at

the discretion of local justices of the peace, to appoint what officers were necessary to maintain law and order. Many of those appointed were unpaid. The rest received grossly inadequate wages. In London there was a host of parochial police administrations, all badly managed; a number of parishes were entirely unpoliced, while in others the watchmen were in league with the criminals. The only really active police were the Bow Street Runners, whose duties were confined to apprehending major criminals in the City of London.

Peel's Metropolitan Police

In 1829, Peel's Act "for improving the police in and near the metropolis" instituted the first properly organized police force in the U.K. The Act brought London police, with the exception of the City police, under the jurisdiction of the Home secretary, defined the metropolitan police district, and appointed two justices of the peace, afterwards called commissioners, to frame regulations for the administration of the new force.

Remembering that in other countries an organized police force had invariably been used for political oppression, the public was at first hostile to the new force, and agitation against it led to riots. Within a year of the passing of the Act, however, virtually the whole of London was policed under a single authority, and gradually the force won recognition and respect through its superiority over the old watchmen. Before long, provincial authorities were petitioning the Home secretary for the loan of metropolitan police officers to organize their local police forces.

Under the Municipal Corporations Act of 1835, watch committees were established in the provinces and made responsible for the appointment of head constables and the recruitment of police forces. Such committees were required to make quarterly returns of their police to the Home secretary. In 1839 a further Act authorised justices at quarter sessions to raise police forces for the protection of their counties, so introducing the county police, as distinct from the borough police established in 1835. A police Act of 1856 made the existence of an adequate police force compulsory throughout England and Wales, while the Police Act (Scotland) of 1857 and the Burgh Police Act (Scotland) of 1892 provided and regulated sufficient police forces throughout the counties and burghs

of Scotland. By an Act of 1888, no borough in England or Wales or burgh in Scotland with fewer than 20,000 inhabitants could have a borough police force.

Consequent upon these various Acts, all the police forces in the U.K., except for those of London and N. Ireland, are under the partial control of local authorities: recruitment, pay, and conditions are the responsibility of the local authority, but the Home secretary's approval is required for increases in establishment, for promotion to higher grades, and appointment of chief constables. In a county the local authority is the standing joint committee of the county council and of the justices at quarter sessions, the disciplinary authority being the chief constable; in a county borough the administration and disciplinary authority is the watch committee. Cost of administration is borne partly by a charge on the local rates and partly by a grant from the Exchequer. Since 1947 non-county boroughs ceased to have police forces separate from the county forces unless their 1939 population exceeded half the population of the county. In 1947 the cost of the police in England and Wales was £55,312,548, of which £33,977,000 was met from local rates. Police in Scotland are administered partly from the Scottish office and partly by county and burgh authorities; in 1947, their cost was £23,503,235, of which £21,335,515 was contributed by the Scottish office. The police forces of Glasgow, Aberdeen, Edinburgh, Dundee, and Greenock were established by special Acts of parliament. The City of London force is controlled by the City corporation, its commissioner being appointed by the court of common council.

Under the Act of 1856, inspectors of constabulary, appointed by the Home office, report annually upon the police forces in England and Wales. Upon their reports depends the granting of a force's certificate of efficiency and the consequent Treasury contribution of half the cost of pay and clothing.

Police Act of 1919

After the First Great War some discontent existed amongst police forces in the U.K., culminating in police strikes in London and Liverpool. In March, 1919, the Home secretary appointed a committee of inquiry to cover some 250 forces. This recommended that the general police system be retained on existing lines, but with a greater degree of standardisation in regard

to pay, allowances, pensions, and conditions of service. It further recommended that a police federation be established, with membership open to the personnel of all forces below the rank of superintendent, to look after the interests of policemen and to act as an official negotiating body with the Home secretary. All these recommendations became law under the Police Act of 1919. Every police officer is now an officer of the crown within the meaning of the Official Secrets Act. He may not be a member of a trade union.

Enlistment and Training

Throughout the U.K., police forces are generally organized and maintained on the lines of the London Metropolitan Police. Candidates must be between 21 and 30, and are required to pass stringent medical, educational, and character tests. Enlistment is for a minimum of ten years, with the option of extending to 20-25 years to qualify for pension, which is usually at the rate of two-thirds of salary. Uniform is provided free, with the exception of boots, for which a special weekly payment is made. Officers not living in section houses are paid a rent allowance. Metropolitan police recruits are trained at Peel House, Westminster (established 1907). Mounted police are trained at Imber Court, Surrey, damaged by bombs during the Second Great War but later reopened; and those for the mobile section at the driving school at Hendon, Middlesex.

In 1934 a Metropolitan Police College was established at Hendon by Lord Trenchard, then commissioner for the Metropolitan police, for the training of candidates for the higher ranks of the force. The college was open to students without previous police experience and was designed to attract men of the university graduate type to a police career. Students who successfully completed the course were appointed to the rank of station inspector. This innovation aroused considerable resentment within the force, and the college was closed in the Second Great War.

After the war, a national police college was established at Ryton, near Coventry, to serve all police forces in England and Wales. Unlike the Hendon college, it is a staff and not a cadet college, the entrants being men who have served at least five years in a police force. No sergeant or constable is eligible for promotion to inspector until he has passed through a six weeks' residential course. There are a senior

residential course of three months to provide training for the higher ranks, and short subsidiary courses for senior and junior officers, and for dominion, colonial, and other overseas police officers.

All policemen start their careers as constables, and if in the foot branch, which constitutes the largest section of a force, are given a beat, the length of which depends upon the size and population of the town or district. While on his beat the policeman must not smoke or frequent licensed premises, and must not engage in conversation with the public except to answer questions or in the course of duty. When on duty in uniform constables and sergeants wear a blue and white striped brassard above the right cuff of the tunic or greatcoat, except in the City of London, where the brassard is red and white.

Each police division is subdivided into districts, with a police station in charge of a station sergeant. In country districts a policeman's beat may cover an area of several square miles and include one or more villages. Larger villages have a policeman permanently stationed in them, his house serving as the local station.

Plain-clothes policemen normally serve a probationary period in uniform, and if they show particular aptitude may be transferred to the Criminal Investigation Department (*q.v.*), which is concerned with the detection of crime; or to the Special Branch, which is responsible for protecting royalty and other prominent persons and for inquiries concerning the security of the realm. The closest cooperation exists between the uniformed police and the C.I.D.

Control of Traffic

Police are responsible for traffic control and the general safety of the road and vehicles. Until the introduction of traffic lights a constable was on point duty at the intersections of all busy thoroughfares and crossings. In 1934 successful experiments were made with autogiros for the controlling of heavy traffic streams at the Derby race meeting. The traffic branch is the authority for licensing taxicabs, buses, and other public service vehicles, and has the power to close any thoroughfare to all vehicles or any type of vehicle. Mounted police are responsible for controlling crowds at processions, sports meetings, etc. Seaports and river towns have marine or river police to regulate water-borne traffic and prevent the

pilfering of cargoes. In London the river police, equipped with fast motor launches and recruited mainly from ex-naval personnel, patrol 36 m. of the Thames.

After the First Great War the Metropolitan police were rapidly modernised and equipped to meet the changed conditions brought about by the development of the motor vehicle and the emergence of the more technically minded criminal. Police motor-cycle patrols were organized in 1921 to assist in the control of traffic, and a "flying squad" (*q.v.*) equipped with fast cars was formed, to enable members of the C.I.D. to reach quickly the scene of a crime. In 1927 mobile patrols were established on a large scale, their cars being in two-way radio communication with the operations room at Metropolitan police h.q., New Scotland Yard. In 1947 mobile police in the metropolitan area travelled some 13,000,000 car miles.

Police boxes, enabling the public to establish telephone communication with the nearest police station, had been set up throughout London and in most provincial centres by 1930. They contain a small cell for the holding of a prisoner until the arrival of a police car, and first aid equipment for dealing with accidents. On the roof is an electric lamp which can be illuminated from the police station to call a policeman on the beat. A further development was an arrangement with the G.P.O. whereby the dialling of 999 on any automatic telephone immediately brought a mobile police patrol to any person requiring police service. All large police forces now have forensic laboratories to provide every scientific aid in the detection of crime (*see* Criminology).

Women Police

In 1920 the first women police went on duty and proved invaluable in large cities for such duties as child welfare and the protection of girls against immoral influences. Later, women police in plain clothes were employed with the C.I.D. in general investigation work. In 1947 there were 1,283 women police in England and Wales and 97 in Scotland. During the Second Great War large numbers of women were recruited into the Women's Auxiliary Police Corps as motor drivers and clerks, and on communications; they wore uniform but were not attested and did not enjoy constabulary authority.

Supplementing the regular police forces are the Special Constabularies (*q.v.*). The Second Great War necessitated further reinforcement from three types of auxiliary police: the 1st reserve, consisting of re-engaged pensioners who volunteered to rejoin for the duration; the 2nd reserve, special constables accepting engagement on a full-time paid basis; and the 3rd reserve, the War Reserve (*q.v.*), men recruited for service during the war only. The maximum numbers in the police forces in England and Wales during the war was 91,025 in 1941, and the minimum, 63,331 in 1945. Enemy action caused the death while on duty of 278 officers, including auxiliaries, women police, and civilian employees.

Regular police officers were reserved from the fighting services until 1941, when men under a certain age were permitted to volunteer as pilots and observers with the R.A.F. and Fleet Air Arm. The following year regulars under 35 were "de-reserved." A number of police officers were temporarily commissioned in the security and investigation branches of the Royal Navy, R.A.F., and Army. Altogether 16,700 police officers from forces in England and Wales served in the fighting services; 1,275 were killed, 219 permanently disabled.

Post-War Strength

After the war the regular police forces found themselves considerably undermanned, the Metropolitan police, for example, being some 6,000 below establishment. Lack of man-power was due in large measure to the retirement of time-expired officers who had remained on duty until war ended, while the shortage of housing made it difficult for recruits to find living accommodation in districts where their services were most needed. In 1947 the total police strength of England and Wales was 66,935, and of Scotland 6,643.

Since the Police Acts of 1829, the constable's uniform has undergone few changes. In 1867 the cut-away coat and top hat worn by the original "Peelers" was replaced by a tunic and helmet. The whistle was introduced in 1884. Certain provincial forces have a distinctive helmet, *e.g.* the Devon County Constabulary, who wear spiked ones. City of London police wear a helmet with a crest or spine similar to that worn by the Roman centurions.

With the exception of the Royal Ulster Constabulary, all

police forces in the British Isles are unarmed, except for a truncheon, and are administered on a strictly civil basis. Recruits to the Royal Ulster Constabulary undergo an intensive course of semi-military training, and when accepted for duty are subject to military discipline. They live in barracks and no man is permitted out in plain clothes unless detailed to do so or on leave. Officers are not allowed to serve in their home town, and one who marries a local woman is immediately transferred to another district. They are always armed on duty.

Dominions and Other Countries

Certain of the British dominion, colonial, and other overseas police forces are also organized on semi-military lines, and where there are large coloured populations there is usually an armed European police and an unarmed native police, the latter's authority being restricted to the coloured population. Foreign police forces are in general of a military character, but in certain countries, notably France, there are two types of force: the *gendarmerie*, which corresponds approximately to the London Metropolitan Police, and the *Garde Mobile*, a military force concerned with the maintenance of order during strikes, etc.

In the U.S.A. each state administers its own police force, or grants powers to certain municipalities. Generally speaking, the public attitude towards the police in American cities differs from that in the U.K. The policeman is not so commonly regarded as a friend of the community, and an American is less likely than an Englishman to turn to him for help in an emergency. Exposures made from time to time of the exercise of political patronage in police appointments, and of police complicity with the racketeers, have led to considerable lack of confidence in his integrity. The frequent use of the "third degree" (*q.v.*) for extorting confession is another notable difference from British practice. In rural areas of the U.S. the officers mainly entrusted with the duty of preserving law and order are the sheriffs. For an account of the U.S. federal organization corresponding to the C.I.D., *see* G-men. Some depts. of the federal govt. also maintain special police for the prevention and punishment of specific offences, *e.g.* the treasury dept.'s secret service for suppressing counterfeiting and that of the post office for dealing with fraudu-

lent use of the U.S. mails. See Canadian Mounted Police; Criminology; Metropolitan Police; Military Police; Palestine Police; Scotland Yard. Consult The King's Peace, F. Inderwick, 1900; Scotland Yard, Sir J. Moylan, 1934; The English Police, H. Glover, 1934; The English Policeman, A. Holmes, 1935.

Police Court. Name until 1944 of magistrate's court, a court of the first instance or court of summary jurisdiction. In London and some other towns such courts are presided over by stipendiary magistrates, and they are dealt with in this work under Metropolitan Police. The judges of others are unpaid justices of the peace. In 1944 the Home office changed the name from police court to magistrate's court.

Police Staff College. Former British police training school established in 1934 at Hendon, Middlesex, for the instruction of candidates for the higher ranks of the London Metropolitan Police. It was closed in 1940. See Police.

Polignac, AUGUSTE JULES ARMAND MARIE, PRINCE DE (1780-1847). French politician. Son of Jules, duc de Polignac (1745-1817), he was born May 14, 1780, and spent his early years in exile in Russia and England. He was imprisoned for participation in the Pichegru conspiracy, 1804, but returned at the restoration of 1814. Made peer of France, 1815, he was ambassador in London, 1823-29, when he became minister of foreign affairs under Charles X. His policy gave dissatisfaction to the country, and his ordinances of St. Cloud precipitated the revolution of 1830. Condemned to life imprisonment, Polignac was pardoned, 1836; published, 1845, *Études Historiques, Politiques, et Morales*; died March 2, 1847. *Pron.* Polinyak.

Polignac, MELCHIOR DE (1661-1742). French cardinal and diplomatist. Born at Puy-en-Velay, Oct. 11, 1661, he showed brilliant scholarship at the Collège de Clermont and was present at the papal elections in 1689 and 1692. Ambassador to Poland from 1693, and from 1710 plenipotentiary in Holland, he negotiated the treaty of Utrecht, and became cardinal in 1713. Forced into retirement during the regency, he was diplomatic representative



M. de Polignac,
French cardinal

in Rome, 1725-32, and was made archbishop of Auch, 1726. A man of considerable literary ability, he was elected to the Académie Française, 1704, and his Latin poem, *Anti-Lucretius*, appeared in 1745. He died in Paris, April 3, 1742.

Poligny. Town of France. In the dept. of Jura, it is picturesquely situated at the foot of the Jura Mts., 38 m. S.W. of Besançon. It contains the ruins of a château, and the early Gothic church of S. Hippolyte. Trade is carried on in wine and agricultural products, and there are oil refineries.

Poliomyelitis. Notifiable disease which occurs in two forms. Acute anterior poliomyelitis is an infectious disease which, attacking certain nerve cells, may cause paralysis. Chronic poliomyelitis is a complaint of adults characterised by increasing atrophy of the muscles. See Infantile Paralysis.

Polish. Substance for improving the surface appearance of wood, metal, leather, etc. The essential condition for a satisfactory polish is that the surface shall be uniform and highly reflective. This is attained by removing blemishes and irregularities, filling pores and cavities, and applying a thin and highly reflective transparent coating. Apart from decorative considerations, a high polish is often necessary for metallic components of machinery. The materials used for polishing metals are abrasive in action (see Abrasives), and usually consist of fine quartz, emery, crushed pumice, and chert, often mixed with a soap solution, so that there is also a cleansing action. In the cleaning and polishing of such metals as aluminium, steel wool, together with soap and an abrasive powder, is often used.

To polish wood, apart from the special process of French polishing (*q.v.*), it is usual to apply a material which is partly cleansing and slightly solvent as well as leaving a wax coating. The normal constituents of such polishes are wax, soap, oil, water, and turpentine, mixed so as to produce an emulsion. For leather polish, especially boot polish, a similar emulsion is used, with the addition of a pigment, such as carbon black, and sometimes with shellac and borax, which increases the waterproofing qualities. Fine abrasives are also used to polish such materials as stone, ivory, and various plastics.

Polish Corridor. Stretch of land ceded to Poland by the treaty of Versailles in 1919 to provide that country with an outlet to the Baltic Sea. The corridor, called in



Polish Corridor. Map showing the Corridor, formerly Poland's only outlet to the sea

Poland the province of Pomorze, passed through former German territory, cutting off E. Prussia from the rest of Germany. Its existence was a constant source of contention. Germany complained that an arrangement cutting the Reich in two was intolerable; Poland declared that the territory had been Polish for centuries until the first partition of the country, and that 80 p.c. of her foreign trade was seaborne. The Germans felt that they did not receive adequate transport facilities between E. Prussia and the Reich; the Poles that they were not properly paid for hauling German trains. In 1934 Hitler concluded a ten-year non-aggression pact with Poland and the problem of the corridor was thought to be settled. But the holding of a plebiscite in the corridor was one of the 16 demands he made Aug. 31, 1939, 9 hrs. before invading Poland. See Danzig.

Polish Resettlement Corps. Civilian body existing in the U.K. from 1946 to 1949, to provide a transition stage between military and civil life for men of the Polish forces who, during the Second Great War, had served under British command outside Poland, and did not wish to return to Poland. Members could (1) enlist in the British army; (2) emigrate overseas; (3) take up civilian work in the U.K. The cost of the corps was borne by the British Treasury under the Polish Resettlement Act, 1947.

Politbureau. Contraction for the political bureau of the Communist party in the U.S.S.R. There

are similar organizations in the party in other countries; but the supreme executive of the U.S.S.R., consisting of some 14 members with headquarters in the Kremlin, Moscow, formulates the so-called "party line" which Communists in every part of the world are required to follow.

Political Economy. Term formerly used for economics (*q.v.*). It was apparently first used by the French writer, Montchrétien, in

1615, and came into general use chiefly as a result of the wide influence of Adam Smith's *Inquiry into the Nature and Causes of the Wealth of Nations*, 1776. Probably the last influential book containing the term in its title was W. S. Jevons's *Theory of Political Economy*, 1871. Within a few years (as exemplified by A. Marshall's *Principles of Economics*, 1890) the term was falling into disuse.

tance from the royal seat tended to abuse of power, and able kings like Henry II invented expedients to curtail their dangerous local greatness. In the 20th century, however, political practice has swung over to the opposite extreme, and in all states, even federations (of which the U.S.A. is an outstanding example), there has been a steady movement towards the centralisation of all administration.

Church and State

The problem of the relation between church and state, though decided in most contemporary societies in favour of the predominance of the state, has from time to time been even more important than that of central and local government. Broadly speaking, four rival theories have contested the field. The first theory was one of dualism. Each of the great entities known respectively as church and state had its own distinct province and need never encroach on that of the other. The civil arm must leave conscience free; ecclesiastics might persuade but never coerce the temporal powers. Collision was thus assumed to be impossible, where each side loyally observed the terms of the pact. This was the theory upon which the relations of Papacy and Holy Roman Empire were supposed to depend throughout the Middle Ages.

Unhappily, this theory proved impracticable. The history of the Middle Ages is one long, sad record of strife between pope and emperor, Guelph and Ghibelline, church and state. Philosophers and men of common-sense came to ridicule the possibility of a hard-and-fast division between two spheres labelled respectively as temporal and spiritual.

A second theory presented all Christendom as forming one commonwealth, one spiritual and material whole, over which Rome was supreme, while the various kingdoms of Europe formed its members. In reaction against this doctrine, the Tudor sovereigns of England, particularly Henry VIII and Elizabeth, were the protagonists of a third, very different view. Papal interference in England was rudely shaken off, and the church in England became one administrative department among many, falling into line with the chancery, the exchequer, and the admiralty. Henry, as head of the state, claimed the right to regulate the religious thoughts and observances of his subjects.

The fourth theory was the voluntary principle, in virtue of which

POLITICS: SCIENCE OF GOVERNMENT

* G. W. Keeton, LL.D., and others

This Encyclopedia contains articles on the various forms of government, e.g. Democracy; also on the political parties, Conservative; Labour; Liberal, etc. See also Aristotle; Government; State

Politics (Greek *politeia*, from *polis*, city or state) is the art, science, and philosophy of government. Rightly considered, political theory is co-extensive with all those branches of knowledge which treat of the eternal principles on which depend the happiness, prosperity, and moral elevation of mankind grouped into kingdoms, states, or nations.

Two ideas, simple yet inexhaustible, underlie all such speculations. The two pillars on which organized society is erected are described sometimes as permanence and progress, sometimes as authority and liberty. The hard-and-fast antithesis thus drawn, however, is more apparent than substantial. Progress towards a definite goal is assured only after stability has been established, and in historical sequence, if not in logical priority, order always precedes freedom. Obedience to the law, and to the magistrates who enforce it, is essential to the rearing of constitutional progress on enduring lines. Neither of the two essentials can exist without the other. Liberty without restraint degenerates into anarchy; authority by itself is tyranny. The problem of political science is how to combine the two in such a manner as will bring out fully what is best in both.

The inhabitants of all countries tend to fall into two groups, those who wish above all things to perpetuate the institutions that have maintained an orderly society in the past; and those who favour change, ranging from liberals who advocate amendments of existing institutions to revolutionaries who desire to replace an existing system by an entirely new one.

It is the duty of the constitutional theorist to consider the claims of all, and in this endeavour two main problems face him: (1)

What is the ideal form of constitution? (2) What are the proper limits to government intervention, and what spheres of human activity should be left to individual initiative? From Plato and Aristotle to near the end of the 19th century, the first of these two problems received major attention: the rival merits of democracies, aristocracies, and monarchies, the conflicts between kings and parliaments. The second group of questions was thrust upon public attention in the 20th century, with the discussion of the rival merits of state action and *laissez-faire*, of socialism, communism, collectivism, individualism, anarchism, syndicalism, fascism, etc.

There is, perhaps, no question vitally affecting individual or national life that has not, at some period of history, formed the subject of keen political controversy. Three important groups of problems are, or have been; (1) the distribution of power between central and local authorities; (2) the relations of church and state; (3) the protection of minorities.

Local Government in England

The entire history of England forms a dissertation on local government. Anglo-Saxon kings, like Alfred or Edgar, ruling the mixed races of the North and Midlands from distant Winchester, were, in the absence of railways and good roads, dependent on their provincial rulers; and a dilemma thus arose. A weakling placed over Mercia or East Anglia failed to enforce order at home and to provide against Danish invasions; a strong local ruler, on the contrary, might grow so strong as to defy his king. Under the Norman sovereigns the problem took new forms. Each county, or group of two counties, was administered by a sheriff, whose tenure of authority and dis-

many churches may exist under the protection of one state. The civil government, while refusing to set limits to its own absolute sovereignty, disclaims direct interference in matters of religion.

What is, perhaps, the most crucial problem of all is that of protecting effectively individual rights and liberties from the tyranny, whether of the one, the many, or the few. In ancient Greece and Rome this problem assumed the form of how best to reconcile a sufficiently powerful executive with constitutional liberty. In Athens and in Sparta the kingly power proved dangerous and was deliberately weakened by division. This principle was carried further in Rome, as a reaction from the tyrannies of Tarquinius the Proud. One king, enjoying a monopoly of kingship, gave place to a number of magistrates known respectively as censors, consuls, praetors, aediles, and tribunes of the plebs.

In England of the Middle Ages a similar menace was met by a new expedient, parliament and parliamentary control. The English monarchy which, for a century after the Norman Conquest, had stood for order as against the barons' wild and lawless anarchy, seemed to change its policy under John. The crown then claimed the widest licence in breaking its own rules, while the barons seemed to stand for law and order in compelling the grant of Magna Carta; the chief problem of English politics from 1215 for many centuries was how to restrain the executive government when despotically inclined. The answer may be found in one word, parliament; the great council of the nation learned how to control the king. This process, begun perhaps in the 13th century, was not completed, even in theory, till the settlement of 1689.

Theory of Political Association

The classical theory of political association, particularly as it found expression in the works of 19th century writers, was that there were certain essential branches of governmental activity, e.g. the preservation of internal order, the protection of the country from external attack, the administration of justice. Beyond these, it was the duty of the state to intervene as little as possible. This is, in essence, a reflection of the individualist, liberal, and *laissez-faire* theories which had developed steadily in the 18th and first half of the 19th centuries. Thus, Sidgwick, writing at the end of the 19th century, says: "The legislation of

modern civilized communities then, is, in the main, framed on the individualistic basis; and an important school of political thinkers are of opinion that the coercive interference of government should be strictly limited to the application of this principle." Already in Sidgwick's day, however, another principle of political activity was making itself felt, and later editions of Sidgwick's classic *Politics* gave increasing attention to what he called "socialistic interference."

Problems of a Planned Society

After his day, political speculation went very much further, and all fashionable theories in the mid-20th century started from the assumption that the community as a whole is more capable of planning the individual's life for the promotion of his health and happiness than the individual could do if left to his own devices. Thus, the increasing centralisation, noticed above, directed by an increasingly powerful executive, in all modern communities, is employed for the purpose of creating a planned society, or social service state. For the time being, therefore, collectivism appeared to have won a complete victory over the individualism which prevailed until the second half of the 19th century.

This is one of the most difficult problems of current political science, for it has often been said that the triumph of democracy has seen the replacement of the divine right of kings by the divine right of majorities. The 19th century found no final answer to this problem, beyond laying down general principles that the majority should not use its power tyrannically, or alternatively, that it should so use it as to secure the assent of the greatest number of the governed. In a homogeneous community such as 19th century Great Britain, such restraints were generally observed, although even there they worked imperfectly where the rights of a racial minority such as the Irish were concerned. At the conclusion of the First Great War, when several new national states were created in Europe, an attempt was made to safeguard the rights of minorities in these states by clauses in the peace treaties, giving the racial minorities the right to appeal to the League of Nations in cases of racial discrimination. These rights were never really effective, and they became obsolete with the declining influence of the League. The Nazi persecution of the Jews in Germany from 1933 onwards, and the mass extermina-

tion of Jews and other groups, in the occupied countries as well as Germany, by the Germans during the Second Great War, showed how terrifyingly ruthless oppression by an intolerant governing clique can be.

The period between the two Great Wars also saw the growth of another dangerous threat to minority rights—the cult of the one-party state in which deviation from the party line, equally with opposition to the party whose interests are identified with those of the state, is regarded as a species of treason, meriting heavy punishment. Such creeds, though allegedly founded upon care for the welfare of the proletariat, are the negation of individualism and freedom of thought, which the individual is called upon to surrender in exchange for the economic security provided by state planning. Thus, the triumph of such collectivist theories, whether Nazi, Fascist, or Communist, has been accompanied by the destruction of all rival political organizations, and the subordination of all other associations to state control or supervision, as well as the death, imprisonment, or exile of all persons of significance whose views are opposed to those of the regime in power. The central political problem of the period immediately following the Second Great War is the issue of the struggle between such intolerant collectivism and the modified and tolerant collectivism of the western world, in which freedom of thought of the individual still retains a place.

Bibliography: Lectures on the Principles of Political Obligation, T. H. Green, 1895; *Political Theories of the Middle Ages*, O. v. Gierke, trans. F. W. Maitland, 1900; *History of Politics*, E. Jenks, 1900; *A History of Political Theories*, W. A. Dunning, 3 vols., 1902–1928; *Centralisation and the Law*, Brooks Adams, 1906; *Greek Political Theory*, E. Barker, 1908; *Elements of Politics*, H. Sidgwick, 4th ed., 1919; *Modern Democracies*, Viscount Bryce, 2 vols., 1921; *A Grammar of Politics*, H. Laski, 3rd ed. 1938.

Politis, NICOLAS SOCRATES (1872–1942). A Greek politician. He was born at Corfu and studied at Paris, becoming professor of international law there and a member of the Institut de France. He served as Greek delegate at the London Balkan Conference, 1912, and was foreign minister, 1917–20 and in 1922, being Greek minister in Paris from the latter date until his death. He was an outstanding authority on international law, publishing many

books on the subject. He died at Cannes, March 4, 1942.

Poliziano, OR **POLITIAN**, ANGELO (1454-1494). Italian poet and scholar. Born in Tuscany, at Monte Pulciano, July 14, 1454, he adopted the Latinised form of the name of his birthplace instead of his patronymic, Ambrogini. Distinguished by his precocity in an age of precocious youth, he won the patronage of Lorenzo de' Medici, and became tutor to his children, and the most brilliant intellectual figure at the court of "the Magnificent." The most remarkable classical scholar of the 15th century, Poliziano was as great in his Italian as in his Latin poems. His unfinished epic, *Giostra*, on a tournament in which Julian de' Medici was victor, has much inherent beauty, and is the first successful example in Italian literature of the use of the octave stanza later employed by Ariosto and Tasso. With his lyrical play *Orfeo* (the story of Orpheus and Eurydice), he originated pastoral drama and opera in Italy. Poliziano died Sept. 24, 1494, two years after Lorenzo.

Polk, JAMES KNOX (1795-1849). President of the U.S.A. Born in Mecklenburg county, N. Carolina,



James A. Polk

Nov. 2, 1795, of Scottish-Irish descent, his original name being Pollock, he was called to the bar in 1820. Hesoonturned to politics, and in 1823 he was elected to the legislature of Tennessee, and in 1825 became a member of congress. For eight years he was speaker of the house of representatives, and during 1839-41 governor of Tennessee. In 1844, Polk, as the Democratic candidate, was elected president, his opponent being Henry Clay. During his term the Mexican war took place, and the Oregon boundary dispute with Great Britain was settled. A reduced tariff system was introduced in 1846, and a bill passed for setting up an independent United States treasury. A bill to sanction the expenditure of large sums on internal improvements was vetoed by him. Polk died at Nashville, Tennessee, June 15, 1849.

Polk, LEONIDAS (1806-64). American soldier. Born at Raleigh, N. Carolina, April 10, 1806, he was educated at West Point and entered the army. In 1831, however, he

was ordained in the Episcopal Church, and in 1838 became a bishop in charge of an immense tract of country in the south of the U.S.A. On the outbreak of the Civil War in 1861 he returned to military life and was soon a major-general in the Confederate army. He held various commands with success, including that of a corps in the army of the Tennessee, until charged by Bragg with delay in attacking at Chickamauga. Jefferson Davis, however, exonerated him, and he was still in the field when he was killed, June 14, 1864.

Polka. Round dance said to have been invented about 1830 by a Bohemian servant girl. The name is probably derived from *pulka* (half), referring to the very short steps necessitated by the small dimensions of the room in which the inventor usually danced. In a few years the polka overran Europe, and its extraordinary popularity attained such a height as to become almost a mania, streets and public-houses being named after it. Its lively character and the simplicity of its steps no doubt conduced to this. It has virtually disappeared from the ballroom, except as a kind of reminiscent romp, usually to the tune, *See Me Dance the Polka*. The music is in 2-4 time, the characteristic feature being the rest on the second beat.

The man begins with the left foot, his partner with the right. Three steps are danced forward, three back again, and then six turning round, after which the same order is resumed.

Poll (Mid. Eng. *pol*, back of the head). Taking of votes in order to ascertain the wishes of the people qualified to vote. The polling booth is the place where electors go to record their votes, and the polling day the day fixed for the voting. The announcement of the result is called the declaration of the poll. (See Election; Hustings; Vote.)

The poll plays a part in English company law. Every company, by its charter or articles of association, provides a mode whereby shareholders may vote at company meetings. It is a common provision that votes shall be taken by show of hands, but that if a fixed number of shareholders should be dissatisfied with the result of such a vote as announced by the chairman, a poll may be demanded. See Company Law; Gallup Poll.

Pollack (*Gadus pollachius*). Common British fish, belonging to the cod family and nearly related to the coal fish. It is usually about



Pollack, a British fish belonging to the cod family

20 ins. long and is of a greenish colour, with a dark spot near the pectoral fin and no barbels. It occurs off the coasts of Cornwall and Devon, Norway, N. America, etc., and is valuable as a food fish and as a source of oil.

Pollaiuolo, ANTONIO (1429-98). Born at Florence, he studied under



A. Pollaiuolo, Italian painter

Bartoluccio, the goldsmith, and founded a prosperous school of painting, engraving, sculpture, and enamelling. In painting he was the foremost of the Florentine realists, insisting on anatomical truth at the expense of poetic sentiment; he often collaborated with his brother Piero. During 1489-96 he was in Rome, but died at Florence. His Martyrdom of S. Sebastian and Apollo and Daphne are in the National Gallery, London.

Pollanarua. Former name of an ancient capital of Ceylon, Topare (*g.v.*).

Pollard, ALBERT FREDERICK (1869-1948). British historian. Born at Ryde, Dec. 16, 1869, he was educated at Felsted and Jesus College, Oxford. Settling in London, he began to work as an assistant editor of *The Dictionary of National Biography*, was recognized as an authority on Tudor times, and during 1903-31 was professor of history at London University. In 1908 he was elected a fellow of All Souls College, Oxford, a position he held until 1936. During the First Great War his lectures and writings thereon were the most careful and dispassionate utterances produced by the crisis. He founded the Historical Association in 1906, editing its journal, *History*, from 1916 to 1922. He lived until Aug. 3, 1948. Pollard wrote widely on historical subjects, among his books being *Henry VIII*, 1902; *Life of Thomas Cranmer*, 1904; *The British Empire*, 1909; *A History of England*, 1912; *The Evolution of Parliament*, 1920 (4th ed., 1938). He wrote the article *Parliament* for this Encyclopaedia.

Pollarding. Removal of all the branches at the head or poll of a tree, in order to induce the stem to throw out fresh branches. Willows and elms are the trees most usually pollarded, the latter for reasons of safety. See Forestry.

Pollen (Lat., fine flour, mill-dust). Mealy substance, usually yellow, formed in the anthers of flowering plants and comparable organs of conifers. The grains of which it is composed contain the male nuclei, which fuse with the female initiates in the ovules to bring about the formation of an embryo and other changes through which the ovule becomes a seed.

In plants that are pollinated by the wind the pollen grains are dry and light. Most forest trees are so pollinated, and the pollen may be carried a long distance by the wind. In other cases the pollen-grain is variously roughened that it may the more easily catch upon the hairy bodies of the insects that act as pollen-carriers. In the orchids the pollen-grains have long threads which are united to form a stalk to the pollen-mass (pollinium), and this may be carried away bodily by attachment to the head of a visiting insect, thus reaching the stigma of the next orchid visited. See Bee; Flower.

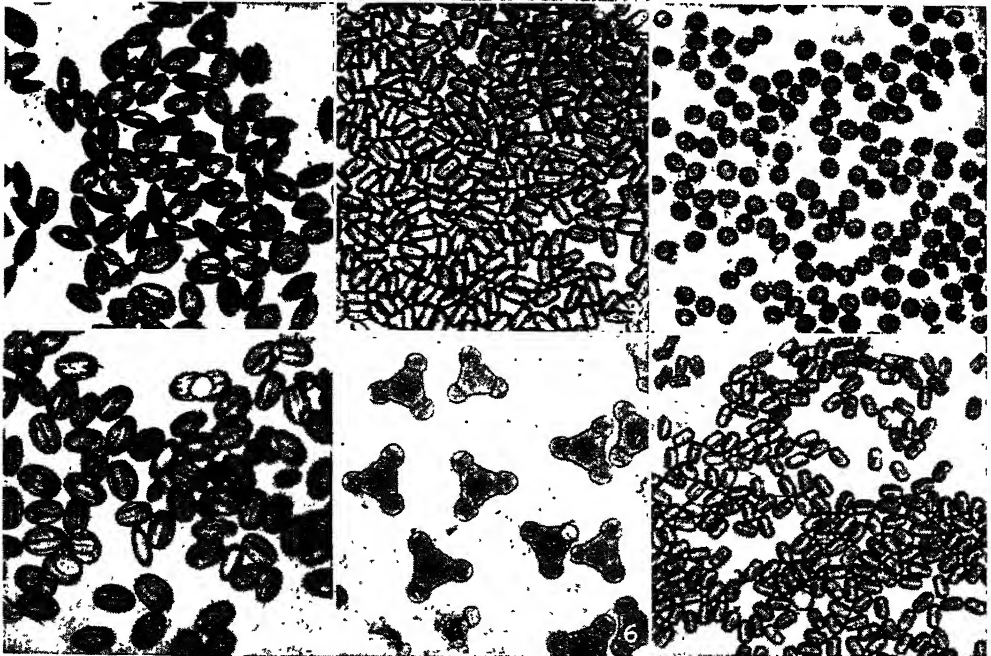
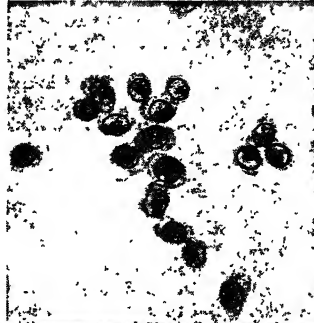
Pollentia. Town of ancient Italy, on the Tanaro, 30 m. S. of Turin. Here, in 403, Stilicho defeated Alaric and the Goths. Remains of an aqueduct amphitheatre, temples, etc., still exist. The modern town is called Pollenzo.

Pollination. Process antecedent to the fertilisation of the ovules of a seed-bearing plant. Pollen grains are brought to the stigma (angiosperms) or the micropyle (gymnosperms), where they are stimulated into activity and produce pollen tubes which ultimately penetrate into the ovules, thus facilitating fertilisation by introducing the male gametes.

In the simplest form of pollination, known as autogamy or self-pollination, and found in many of

the commonest weeds, the anthers are so situated in relation to the stigma that the pollen fertilises the ovules of the same flower. In the majority of plants, however, means, often elaborate, are taken to prevent self-pollination, and to obtain the aid of external agents in effecting cross-pollination. The pollen may be impotent as regards the ovules of the same flower; or the male organs (stamens) may be in separate flowers or on separate plants from those that bear the female organs (pistil). Or a species may bear on different individuals two or more forms of flowers (long-styled, short-styled, etc.), and the pollen of one form can be transferred only to those of the other form. This is known as heterostylism, and is familiar in the flowers of the primrose and cowslip (pin-eyed, long-styled, and thrum-eyed, short-styled).

In a few conifers and many British forest trees the sexes are on distinct trees (dioecious), and the pollen is carried from one to the other by the wind. This is a wasteful method, and many plants have improved upon it by enlisting the service of insects as carriers, attracting them to the flowers by conspicuous colouring, which is usually accompanied by the pro-



Pollen. Highly magnified specimens from British trees and plants. 1. Cedar of Lebanon, *Cedrus libani*, showing air sacs. 2. Willow Herb, *Epilobium angustifolium*. 3. Lupin, *Lupinus*. 4. Thistle species. 5. Sage, *Salvia officinalis*. 6. Evening Primrose, *Oenothera biennis*. 7. Sweet Pea, *Lathyrus odoratus*. All are magnified 66 times except 3 and 5, which are magnified 100 times

vision of nectar and often by seductive odours. Many flowers are suited by their shape and colour to particular insects; thus we can recognize bee-flowers, butterfly and moth-flowers, wasp-flowers, beetle and fly-flowers, and so forth. Fly-flowers are often noticeable from their dull purple-brown tints or their odour of carrion. With a few plants small birds, such as the humming birds, are the pollinating agents, and more rarely snails discharge this office. *See Botany; Clover; Flower; Plant.*

Pollino, MONTE. Peak of the S. Apennines, Italy. It is situated on the borders of the provs. of Potenza and Calabria, 10 m. N.W. of Castro Villari, and reaches an alt. of 7,325 ft.

Pollio, GAIUS ASINIUS (75 B.C.-A.D. 6). Roman soldier and man of letters. He first became prominent by attacking Cato for his violent action on behalf of the senate, and attached himself to Julius Caesar, with whom he served in Gaul and crossed the Rubicon. Pollio fought in Epirus, was present at Pharsalus, and held military appointments in Africa and Spain. He espoused the cause of Antony, negotiated the terms between Antony and Augustus, and finally became a friend of the latter. In 40 B.C. he was consul. Even during his active career he achieved distinction as an orator and poet, and later devoted himself to literary pursuits, writing a history of the civil war, unfortunately lost. Pollio was the first to set up a public library at Rome, where he was a friend of Horace and of Virgil, who dedicated his fourth and eighth Eclogues to him.

Pollitt, HARRY (b. 1890). British political organizer, born Nov. 22, 1890. He was a weaver's helper in a Lancashire cotton mill at 12, later a boilermaker. He was secretary of the Communist party of Great Britain, 1929-39 and 1941-46. In 1925 Pollitt was sentenced to 12 months' imprisonment for sedition. During the Spanish Civil War he helped to organize the British battalion of the International Brigade. He published books and pamphlets about the Communist point of view.

Pollock, SIR DAVID (1780-1847). British judge. Son of David Pollock, saddler to George III, he was born Sept. 2, 1780, and educated at S. Paul's and Edinburgh university. Called to the bar in 1803, he practised as a special pleader on the home circuit and in the insolvent debtors' court. Appointed recorder of Maidstone

in 1838, and commissioner of the insolvent debtors' court in 1842, he was knighted in 1846 on becoming chief justice of the supreme court of Bombay. He died May 22, 1847.

Pollock, SIR FREDERICK (1845-1937). British jurist. Eldest son of Sir W. F. Pollock, Bart., he was born in London, Dec. 10, 1845. Educated at Eton and Trinity College, Cambridge, he became a barrister in 1871. In 1882 he was appointed professor of jurisprudence at University College, London, and during 1884-1903 was Corpus professor in the same subject at Oxford. Also, 1884-90, he was professor of common law to the Inns of Court, and he edited *The Law Quarterly Review* and *The Law Reports*. He succeeded to the baronetcy in 1888, and in 1911 was made a privy councillor. His many honours include a fellowship of the British Academy. He died Jan. 18, 1937. Besides writing *Essays in Jurisprudence and Ethics*, 1882; *Principles of Contract*, 1911; *For My Grandson (reminiscences)*, 1933, Pollock produced with F. W. Maitland the standard *History of English Law*, 1895.

Pollock, SIR GEORGE (1786-1872). British soldier. Born June 4, 1786, son of David Pollock, saddler to George III, he entered the army of the East India Company in 1803, and served in the campaign against Holkar, 1804-05, in Nepal, 1814, and the first Burmese War, 1824-26. In the expedition for the relief of Jalalabad he fought his way through the Khyber Pass, relieved Sir Robert Sale, and reached Kabul, and was rewarded with the G.C.B. Returning to England, 1846, he became a director of the East India Co., was made a F.M. in 1870, a baronet in 1872. He died Oct. 6 that year.

Pollokshaws. District of Glasgow, formerly a separate burgh. It stands on the White Cart, and is connected with the city proper by rly., tram, and bus. To the S.W. of Glasgow, it is mainly an industrial area. There is a town hall, and other public buildings include churches and schools. Having become an industrial centre, Pollokshaws was made a burgh in 1813. The name means the shaws or woods of Pollok, which is the name of a Glasgow constituency.

In 1912, pop. about 13,000, it was absorbed into Glasgow (*q.v.*).

Pollokshields. District of Glasgow. It is S.W. of the city proper, and is served by rly., tram, and bus. Chiefly a residential quarter, it was absorbed into Glasgow in 1891. Here is Maxwell Park.

Poll Tax. Impost levied on every poll or head; sometimes called a capitation tax or charge or fee. It was applied in ancient Greece, and on various occasions in the U.K.; it is still levied as a means of financing services in certain African colonies; and in the states of Alabama, Arkansas, Mississippi, S. Carolina, Tennessee, Texas, and Virginia a poll tax is imposed as a condition of eligibility to vote.

In 1377 a poll tax of 4d. was levied on every man and woman in England above the age of 14, except beggars. In 1379 an attempt was made to graduate the amount of the tax according to the position and wealth of the individual, the charges varying from £6 13s. 4d. for a duke to 4d. for a married man and his wife. Poll taxes were commonly imposed on aliens during the 15th century; but no general one was levied between 1380 and 1513. It was then graduated according to means. The idea of the poll tax was revived by the Stuarts, and the last was in 1698; it was steeply graduated from a payment of nothing to one of 20s. Income tax is the successor of the graduated poll tax, though it draws a clearer distinction between income and capital.

Pollution. As applied to the atmosphere, term denoting the presence of smoke and, to a lesser extent, dust particles. Atmospheric pollution is derived chiefly from burning coal under conditions which render combustion incomplete. When the temperature of industrial furnaces or domestic fires is not sufficiently high, some of the carbon present in the fuel as hydrocarbons fails to combine with oxygen to produce carbon dioxide, and instead is carried by rising air up the chimney, from which it escapes as coagulated particles of soot. Coal also contains sulphur, the burning of which results in sulphur oxides and sulphuric acid, the agent largely responsible for corrosion of objects and damage to buildings. Smaller quantities of other polluting substances such as nitrous acid, chlorine, and ammonia are likewise projected into the air of towns. In industrial processes the introduction of more efficient furnaces and the washing



Sir George Pollock,
British soldier

of flue gases before emission, and in homes the replacement of coal ranges by gas and electric cookers, have contributed greatly to the abatement of smoke. Despite these measures, it has been estimated that pollution in Great Britain causes damage to the extent of £40,000,000 annually.

Atmospheric pollution may be regarded as composed of gases, large particles which are deposited fairly quickly close to their place of origin (e.g. ash and coal dust), and smaller particles (including smoke) which remain in suspension in the air. If the particles in a volume of town air are collected and analysed, about 85 p.c. of their weight will be found to be combustible matter and 15 p.c. ash. The principal distributor of pollution is turbulence rather than wind; the latter merely spreads smoke from the cities to neighbouring districts, while eddy motion lifts smoke from the surface into the upper layers of the air.

The movement for official investigation of pollution in Great Britain dates from 1912, systematic records beginning two years later. With the assistance of local authorities, the department of industrial and scientific research has established a network of observing stations and regularly publishes the measurements. Estimates of the amount of solid matter in suspension in the atmosphere are obtained with automatic filters; such records indicate that on a foggy winter day in London the suspended solids may amount to 4 milligrams per cubic metre. Normally, pollution is least during early morning and afternoon, and greatest about breakfast time and in the evening. It is more convenient, however, to

study the geographical distribution of pollution by collecting the fraction deposited by rain. In the great industrial and manufacturing areas of central Scotland, Yorkshire, Lancs, and London the annual amount exceeds 100 tons per sq. m.

A. J. Drummond, F.R.Met.S.

For the sources and control of river pollution, see Drainage; Filtration; Sewage; Water Supply, etc.

Pollux. In Greek mythology, the twin brother of Castor. See Castor and Pollux.

Pollux. In astronomy, popular name of the star Beta Geminorum, in the constellation of the Twins. It is of 1.2 magnitude. See Castor.

Polly. Ballad opera by John Gay. A sequel to *The Beggar's Opera* (q.v.), with scenes in the West Indies, it was completed in 1728, but its performance was forbidden by the lord chamberlain at the alleged instigation of Sir Robert Walpole (satirised in *The Beggar's Opera*). In 1729 it was published with the tunes of the songs. Its first performance was at the Haymarket Theatre, London, in 1777, with alterations by the elder Colman, but it was withdrawn after a few performances. It was revived at the same theatre in 1782, and at Drury Lane in 1813. A revised version by Clifford Bax, with music arranged by Frederick Austin, produced at the Kingsway Theatre Dec. 30, 1922, ran for 327 performances.

Polly, ALFRED. Central figure of H. G. Wells's story *The History of Mr. Polly*, 1910. A dyspeptic small shopkeeper, suffering the economic and social tribulations of his kind, he is genially and humorously presented as a frustrated romantic, with a natural love of literature and of words (which

he misuses effectively) and visions of a fuller kind of life. After failing to commit suicide, he breaks through his limitations, deserts his nagging, discontented wife and finds adventure and final contentment at an English country inn. A film version, with John Mills as Mr. Polly, was made in 1948.

Polo (Tibetan, *pulu*, ball). Polo is one of the most ancient games in the world. Cradled in Persia, it spread to India, and in slightly varying forms is found in China and Japan. A favourite sport of the Byzantine emperors, later it was revived in India, where it was taken up by British officers, and so spread over the world.

In 1874 the Hurlingham club ground was made, a code of rules laid down, and regular matches and tournaments instituted. Clubs were established at Ranelagh, Rugby, Roehampton, and elsewhere.

Polo grounds are of turf, carefully rolled and tended. The standard size is 300 yards by 160 yards. The long sides are guarded by planks 1 in. thick and 11 ins. high, 2 ins. being in the ground, so that the fence is 9 ins. on the outside. On the inside the turf should be raised and sloped along the boards, so that the ball striking the boards may not lodge under them. The ends are unboarded, and in the centre of each end are the goal posts, 24 ft. apart.

Polo balls are made of willow root in England, and are 3½ ins. in diameter. The weight must not exceed 5 ounces. In India the polo grounds are as a rule unboarded, and the balls made of bamboo root. The polo stick is everywhere of Singapore cane fixed at a slight angle into heads, which in England are of willow or ash, and in India



Polo. An international polo match in progress on the ground of the Hurlingham club, London, seat of the game's governing committee

of bamboo. In India the heads of the sticks are round, and much the shape of a manila cheroot, but in England a square mallet head is preferred. The handle should be shaped like the handle of a racquet, but with a rubber grip and tape wrist-loop. Length and weight vary, but a 53 in. cane with 8 in. head is suitable for beginners.

Polo ponies are bred for the game. The best are those which on a foundation of native British pony stock have grafted thoroughbred or Arab blood. There are also Argentine ponies, Walers or New Zealand ponies, pure Arabs, and American ponies.

The game is played with four players a side. No. 1 and No. 2 are forwards. No. 3 is generally the best player in the team, and plays forward or back as the game requires. No. 4 is back, his primary duty being to defend his goal, and to pass the ball to No. 3, who in his turn tries to serve the ball up to his forwards in attack. In defence it is the duty of every man to ride the corresponding man on the other side off the ball. Thus No. 1 tries to hinder or take the ball from No. 4 on the opposite side, No. 2 from No. 3, and so on. There is no offside. The game is divided into short periods called chukkas. Goals are scored, and the players are handicapped on their goal records.

The governing body of polo is the Hurlingham club polo committee, including representatives of army and county polo and of the leading polo clubs. It selects teams to meet American teams for the Westchester Cup (*q.v.*). No "senior" polo was played in England in 1946 or 1947, and the Hurlingham club was threatened with the loss of its ground.

Bibliography. Hints to Polo Players in India, Gen. Sir H. de Lisle, 1897; Riding and Polo, J. M. Brown, revised T. F. Dale, 1899; Tournament Polo, G. T. Young-husband, 1894; Polo, Past and Present, T. F. Dale, 1905; Polo, T. B. Drybrough, 1906; Modern Polo, E. D. Miller, 3rd ed. 1911; Polo at Home and Abroad, ed. T. F. Dale, 1915.

Polo, MARCO (c. 1254-1324). Venetian traveller. Born of noble parentage, he accompanied his father and uncle in 1271 to China, which the two elders had already visited about 1260. Crossing Persia, Western Asia, and Tartary, through districts unknown to Europeans until modern times, the three Italians crossed the Gobi desert, and eventually reached the city of Shang-tu in

1275. Here they saw the Great Khan, who conceived a liking for Marco, conferred dignities upon him, and even appointed him to an administrative post.

For three years Marco was governor of the city of Yangchow; he was employed on various political missions to India and to other parts of China. The khan was loth to let his visitors go when they expressed a wish to return to Europe, but in 1292 he permitted them to accompany an embassy to Persia, to conduct a Mongol princess as a bride to the shah. During the two years occupied in reaching their destination, many of the retinue perished. Largely owing to the care of the Venetians the girl survived, and was duly handed to her bridegroom. The Polos did not reach Venice until 1295. Three years later Marco, while fighting the Genoese, was taken prisoner, and during his confinement dictated an account in French to one of his fellow captives, Rusticiano of Pisa, who eventually published it as *The Book of Marco Polo*, ed. L. F. Benedetto, Eng. trans., 1931.

Polonaise (Fr., Polish). Stately Polish national dance in three-four time. It has a strong accent on the first beat of the bar, whereas the Mazurka has the accent on the second beat. Its closing cadence represents the final courtly bow. It was idealised by Chopin, whose Polonaises are, however, too complex to convey the impression of the real dance. *See* Dancing.

Polonium. One of the radio-active elements, discovered by P. and M. Curie during their researches on radium. They found that the insoluble residue from pitchblende, after roasting with sodium carbonate and extraction with sulphuric acid, contained another radio-active element, apart from radium. It was precipitated with bismuth by sulphurated hydrogen and

separated chemically. It has since been identified with radium F, the last recognized of the transformation products of radium. The radiation from polonium consists entirely of alpha-rays, identical with those of radium. A substance, called by Giesel beta-polonium, has been shown to be radium E. The element, chemical symbol Po, has atomic number 84. *See* Radium.

Polonius. In Shakespeare's *Hamlet*, a counsellor of King Claudius, and the father of Laertes and Ophelia. Chiefly famous for the rules of conduct which he gives to the former, Polonius is a well-intentioned busybody, against whom Hamlet scores verbal points. But he persuades the king to spy on Hamlet and Ophelia, and, during the prince's conversation with his mother, hides behind the arras, where Hamlet stabs him fatally in mistake for Claudius. A fine interpreter of the part was George Howe, and Felix Aylmer took it on the screen.

Polotsk. Town of White Russia S.S.R. It is in the region of Polotsk, and is 60 m. N.W. of Vitebsk, at the confluence of the Dvina and Polota, and a rly. junction half way between Dvinsk and Vitebsk. A very old town, it was once the capital of an independent principality. The old Kremlin encloses the Greek Catholic cathedral of S. Sophia. At the first partition of Poland in 1772 it was allotted to Russia. The town was captured by the Germans in March, 1918. Taken by the Germans during their drive on Smolensk in 1941, it became an important strongpoint covering the road to Dvinsk, and was recaptured by the Russians July 4, 1944, only after severe fighting through three powerful lines of fortifications and large minefields. Pop. 21,000.

Polperro. Fishing village of Cornwall, England. On the S. coast, 13 m. S.E. of Bodmin, it



Marco Polo,
Venetian traveller
Titian



Polperro, Cornwall. The village and harbour from the west cliff

occupies a picturesque position in a valley and is of special interest to geologists. The chief industry is the pilchard fishery. Polperro has a small harbour, and there is a coastguard station. Formerly it was a market town.

Poltava OR **PULTAVA**. Town of Ukraine S.S.R. It is 70 m. S.W. of Kharkov and stands at the junction of the Poltava and the Vorskla, and is a rly. junction on the Kharkov-Nikolaiev rly. Its chief industries are the making of tobacco, candles, soap, and leather. Pop. 130,305. Peter the Great's signal victory over the Swedes in 1709 is commemorated by a memorial stone set up in the town in 1849 and tumuli on the battlefield, 3 m. to the N.W.

Poltava was captured by the Germans in March, 1918, and was prominent in the anti-Bolshevist campaigns of 1919, being captured by Denikin (*q.v.*) in that year. During the Second Great War the Germans captured Poltava in Sept., 1941. The Russians, recaptured it Sept. 23, 1943.



Poltava. Memorial church built near the battlefield of 1709

Poltava, BATTLE

OF. Fought July 8 (N.S.), 1709, between the Swedish army of Charles XII and the Russians under Peter the Great. In spite of unbroken success, Charles's army was reduced to an efficient force of 20,000 men, chiefly cavalry, the powder had deteriorated, and communications with Sweden were cut off. Poland being as yet unable to help, the king could only rely upon the Tartars, Zaporogian Cossacks, and Wallachians, and while awaiting their arrival laid siege to Poltava in May. A Russian relief force captured the Zaporogian camp and entrenched itself behind the river Vorskla. Charles having been incapacitated by a wound, Marshal Rehmskjöld succeeded in the command of the Swedes, and on July 8 (N.S.) attacked the lines of the Russians, who outnumbered the Swedes by four to one. At first the Swedes were victorious on both wings, but Peter counter-attacked and enveloped them. With the help of a new gun he annihilated the Swedish infantry. This was ranked by Cressy as one of the world's decisive battles. See Charles XII.

Poltergeist (Ger., noisy ghost). In spiritualism, name given to the supposed agent of inexplicable

occurrences in a house, *e.g.* the rattling of crockery, moving of furniture, etc. The phenomena referred to have been common since ancient times in most parts of the world. In a number of cases—*e.g.* at Woodstock in 1649, described in H. More's *Continuation of Glanvil's Collection of Relations in*

Proof of Witchcraft; at Tedworth, dealt with in Joseph Glanvil's *Sadducismus Triumphatus*; and the Cock Lane Ghost, successfully laid by Dr. Johnson and his friends—the apparent mystery has been proved to be the result of human agency, a cleverly managed trick. But, as the inquiries of the Psychological Research Society seem to show, some occurrences permit, if they do not compel, even the frankly sceptical to keep an open mind on the subject of the doings of the poltergeist. The most celebrated case of poltergeist activity in the 20th century was at Borley rectory. See Cock Lane; Demonology; Haunted House; Witchcraft. Consult *Poltergeist* over England, H. Price, 1945.

Poltortsik. An older name of Ashkhabad (*q.v.*), the capital of Turkmen S.S.R.

Polyaenus (2nd century A.D.). Greek rhetorician and advocate. A native of Macedonia, he settled at Rome during the reign of Marcus Aurelius, for whose benefit he compiled a work called *Strategemata* (military stratagems) at the beginning of the campaign against the Parthians (162–165). Originally consisting of eight books, six of which are extant complete, it contains examples not only of military strategy, but of astuteness in other branches of life. He also wrote on Thebes and Macedonia.

Polyandry (Gr. *polys*, many; *andres*, males). Plurality of husbands. Usually deemed to arise from a paucity of women, especially in mountainous, insular, or sterile regions, it is often associated with food-scarcity and girl-infanticide. Its antithesis is polygyny. In the fraternal form, a man's brothers share his marital rights, as among the agricultural Tibetans



Polyanthus. Flowers and leaves of this hybrid

and Todas. The non-fraternal form among the Nayars of India, and in the Marquesas islands, is scarcely distinguishable from communal marriage. See Marriage; Polygamy; Society.

Polyanthus (Gr. *polys*, many; *anthos*, flower). Garden hybrid originally derived from crossing the cowslip (*Primula*

veris) and the primrose (*P. acaulis*). By selection and further crossing an almost endless variety of form and colour has been raised.

Polybius (c. 210–120 B.C.). Greek historian. He was born in Megalopolis in Arcadia, and his father was one of the leaders of the Achaean League in its resistance to the dominion of Rome. Deported to Italy after the conquest of Macedonia, Polybius had the good fortune to be received in the household of Aemilius Paulus, with whose son, the younger Scipio, he formed a life-long friendship. Polybius was with Scipio at the destruction of Carthage in 146 B.C. The same year saw him in Greece, and when the inevitable defeat took place Polybius succeeded in securing the most favourable terms for his countrymen. Statues were erected in his honour in several of the cities of Greece. Already Polybius had begun to collect material for his great work, a history of Rome from 221–146.

Of the 40 books of the history, only the first five survive, but these and fragments of the lost books make it clear that the general thesis of the work was to show that the passing of dominion into the hands of the Romans was inevitable, because they were more fitted to rule than the nations they conquered. Polybius is no stylist, yet he ranks high as an historian. See Greek Literature; consult Ancient Greek Historians, J. B. Bury, 1909.

Polycarp (c. 69–155). Apostolic father and saint. Born about A.D. 69, he is said to have become a Christian about the year 80. According to Irenaeus, he was a disciple and friend of S. John, who is said to have consecrated him bishop of Smyrna about the year 96. It is supposed that he was the angel of the Church in Smyrna (Rev. 2, v. 8). One of his pupils was Irenaeus. Polycarp was the author of an Epistle to the Philippians, and about 155 he went to Rome to confer with Anicetus on the question of the date of the Easter festival

and other matters of Church observance. Soon after his return to Smyrna he was apprehended in a local persecution of the Christians, and burnt at the stake.

Polyclitus (5th century B.C.). Greek sculptor. He was probably a native of Sicyon, but was identified with the school of Argos, where he lived. One of the greatest artists of his time, his Doryphorus (spearman), of which there are copies at Rome, Florence, Naples, and Berlin, was, according to Pliny, the last word in perfect sculpture. Among his other works are the Diadumenus and the famous chryselephantine statue of the goddess Hera, once in the temple at Argos. Portraits, etc., by him have been discovered at Olympia, Delos, and Samos. There was also a younger Polyclitus, architect and sculptor, who flourished in the 4th century. *Pron.* Polly-cly-tus.

Polycrates (d. 522 B.C.). Tyrant of Samos. By creating a fleet, he extended his dominion to other islands and the coast of Asia Minor, and became exceedingly powerful and wealthy. His good fortune was so constant that Amasis, king of Egypt, who had entered into an alliance with him, became uneasy, thinking that such unvarying prosperity would eventually provoke the anger of the gods. According to Herodotus, Amasis asked his ally to throw away one of the most valued of his possessions. Polycrates threw a beautiful ring into the sea, but the next day it was brought back to him by a fisherman, who had found it inside a fish which he had caught. Amasis was now certain that such luck could not possibly last, and broke off the alliance. Polycrates repelled the attacks of various enemies, but was finally decoyed to the Asiatic mainland by a Persian governor, and crucified. The ring of Polycrates is the subject of one of Schiller's ballads.

Polygalaceae. A family of herbs and shrubs, natives of temperate and tropical regions. They have chiefly alternate leaves (rarely opposite), and irregular flowers. The roots have diuretic, emetic, and purgative properties, and *Polygala senega* and *Krameria triandra* are employed in medicine. *See* Milkwort; Rhatany.

Polygamy (Gr. *polys*, many; *gamos*, marriage). Term commonly used for a plurality of wives. Strictly speaking, however, this is polygyny, from Greek words meaning many women, and its converse is polyandry, having many husbands. Polygamy really includes

the two, and its antithesis is monogamy. Highly developed in negro Africa, polygamy was well established among the Australian aborigines, and in parts of Melanesia. It is of high antiquity among the Semites, by whom it was regulated in early times. It passed into Aryan India and was retained in Mahomedanism. Among many peoples, whose powerful and wealthy classes practise polygamy, marriage is normally monogamous for economic reasons. *See* Marriage; Society.

Polygenism (Gr. *polys*, many; *genos*, kind). Theory attributing to mankind descent from more than one original stock or pair. In one form it claims a separate ancestry for the main human races now extant, on the ground that their physical and mental differences are so fixed as not to be accounted for by the alternative view, called monogenism, of the unity of the human species. *See* Anthropology; Monogenism.

Polyglot (Gr. *polys*, many; *glōtta*, a tongue). Term applied to any book containing, in addition to the original text, various translations of this text, arranged in parallel columns. The term, also used in reference to dictionaries in various languages, is especially applied to particular editions of the Bible.

Among polyglot Bibles are (1) The Complutensian, printed at Alcalá de Henares, Spain (the Roman *Complutum*), for Cardinal Ximenes, 1502-17, published in 6 vols., 1520, and containing Hebrew, Chaldee, Greek, and Latin. (2) The Antwerp, or Biblia Regia, printed by C. Plantin, 8 vols., 1569-72, for Philip II under the supervision of B. A. Montanus and based largely on the Complutensian. (3) Paris, 10 vols., 1628-45. (4) London, or Walton's, 6 vols., 1654-57, ed. by Brian Walton, afterwards bishop of Ches-

ter, one set of which, 1657, was dedicated to Oliver Cromwell and known as the Republican; and the other to Charles II, 1660, called the Loyal. It contains Hebrew, Samaritan, Aramaic, Greek, Arabic, Chaldee, Ethiopic, Syriac, Persian, and Latin texts, all except the last named with literal Latin translations, and a Prolegomena by the editor. (5) Bagster's, in Hebrew, Greek, Latin, Syriac, German, Italian, French, Spanish, and English, ed. S. Lee, with Prolegomena. 2nd ed. 1831. Among others is Bielefeld's, ed. R. Stier and C. G.W. Theile, 4 vols., 4th ed. 1875. In 1819 a Polyglot English Prayer Book was published by Bagster.

Polygnotus (5th century B.C.). Greek painter. Born in Thasos, he was the son and pupil of the elder Aglaophon. He decorated the temples of the chief Greek cities with paintings of mythological subjects chosen from Homer's epics, and his idealistic and expressive style greatly raised the status of painting, hitherto subordinate to other arts. When Winston Churchill received his honorary doctorate of Cambridge university in 1948, the public orator described him as *Polygnoti discipulus*. The Athenians gave Polygnotus citizenship, and the Amphictyonic council decreed his maintenance, in Athens and other Hellenic cities, at public expense. *Pron.* Polly-gno-tus.

Polygon (Gr. *polys*, many; *gonia*, angle. In geometry, a closed figure bounded by straight lines. The triangle is the only polygon which is necessarily in one plane. Polygons which do not lie in one plane are called *gauche*; those in which all the angles are equal and all sides equal are said to be regular.

Polygonaceae. A family of herbs, shrubs, and a few trees, chiefly natives of temperate regions. Forming the buckwheat family, they have alternate undivided leaves, whose margins are at first rolled back. The flowers are mostly small and inconspicuous, though sometimes rendered showy by association, as in rhubarb (*Rheum*). They have hard fruits with floury seeds, which in the case of the buckwheat (*Fagopyrum esculentum*) has caused them to be used as food for farm animals. The order includes the docks and sorrels (*Rumex*) and rhubarb (*Rheum*). *See* Rhubarb.

Polygon Wood. Wood of Belgium in the prov. of W. Flanders. It is 4 m. E. of Ypres, and is so named because in its centre was



Polygalaceae. Leaves and flower-spike and, right, root of *P. senega*

once the racecourse (*polygone*) of Ypres. In the First Great War its possession was fiercely contested by the British and Germans in Oct., 1914, but it remained in the possession of the former until May, 1915. It was stormed by Australians, Sept. 26, 1917: retaken by the Germans in April, 1918, and finally cleared of the enemy by the Allies in Oct. An obelisk marks the Australian victory. See Ypres, Battles of.

Polyhedron (Gr. *polys*, many; *hedra*, base). In solid geometry, a solid completely bounded by plane surfaces. The bounding surfaces are polygons and are called faces, where they meet edges, and the points where the edges meet vertices. When all the faces are equal, regular figures, the polyhedron is said to be regular. There are only five regular convex polyhedra, the tetrahedron, hexahedron, octahedron, dodecahedron, and icosahedron.

Polymhymnia. One of the nine Muses (*q.v.*) in Greek legend. Her department was sacred song, and she was represented as pensive, and wrapped in a mantle.

Polymerisation. Chemical change involving two or more molecules of the same substance, resulting in the formation of a new compound with molecular weight a multiple of that of the original. The new compound is called a polymer. Polymerisation has an important practical bearing in the rubber, petroleum, resin, plastics, and paint industries. See Chemistry; Plastics.

Polymorphism (Gr. *polys*, many; *morphe*, form). Occurrence of different forms of individuals in one species of animals. These may occur at different times during the life history of any individual, or as a number of different types for the whole of their lives. See Evolution.

Polyneicēs. In Greek legend, the son of Oedipus, king of Thebes. When Oedipus went into voluntary exile, it was agreed between his two sons, Polyneicēs and Eteoclē, that each should rule by turn for terms of a year. Eteoclē had the first term, but at the end of it refused to give up the throne. Polyneicēs took refuge in Argos, whence he organized and led the first expedition of the Seven against Thebes, in which the two brothers met in single combat and were both killed. Antigōnē (*q.v.*) had Polyneicēs' body buried with honour, in defiance of the orders of the king of Thebes, and was put to death.

Polynesia (Gr. *polys*, many; *nēsos*, island). Term applied to the most easterly of the islands of the Pacific Ocean. Their limits are approximately the tropics of Cancer and Capricorn on the N. and S. and meridian 180° on the W. Hawaii is in the track of the N.E. trade winds in summer and the S.W. winds in the winter; the islands S. of the equator are crossed by the S.E. trade winds. Except Hawaii, which comprised large volcanic islands fringed by coral reefs, they are small in size and, in many cases, coralline in formation. The volcanic islands are forested, but the others are rather bare. Coconuts are produced, and copra forms the chief article of island trade, which largely centres in Auckland and Sydney. Sugar and fruit are grown on the larger islands. Politically, the Hawaiian islands, S. Samoa, and the Baker and Howland islands belong to the U.S.A.; the Society, Gambier, Austral, and Rapa groups, and the E. Marquesas are French; N.W. Samoa, formerly German, has been, since the First Great War, under the mandate of New Zealand; Fiji, the Phoenix, and the Tonga groups are British; and the Hervey or Cook and the Manahiki islands are dependencies of New Zealand, which also assumed control of the formerly British Tokelau or Union group in 1926. See Pacific Ocean.

Polynesian. Term denoting the aboriginal population of the Pacific islands S. and E. of the Micronesian and Melanesian groups. Estimated at 200,000, their ambit lies within a triangle whose corners are New Zealand, Hawaii, and Easter Island, including the Tonga, Samoa, Cook, Tahiti, Paumotu, and Marquesas archipelagos.

Native traditions point to a migration from the Ganges basin, after 450 B.C., of a Caucasoid people who, reaching Java shortly before the Christian era, acquired seamanship, and replaced rice by bread fruit in their dietary. By A.D. 450 they were established in Samoa, two centuries later in Hawaii and the Marquesas, and by 850 in Tahiti and New Zealand, although the present Maoris did not arrive until 1350. These migrations occurred in double canoes and single outriggers, with triangular mat-sails. Melanesian and other elements, ancient and recent, are discernible, the result of ethnic and cultural admixture with previous comers. These predominate in Fiji, which subsequently experienced Polynesian influence from the Tonga or Friendly Islands.

Polynesians are usually lithe and active, averaging 5 ft. 8 ins. in height; olive-brown and longish-headed, they have oval faces and wavy hair, and are cheerful and dignified. Megalithic monuments here and there denote independent streams of influence. Hunting and the bow-and-arrow necessarily fell into disuse, but fishing was highly developed. Cannibalism and infanticide formerly prevailed. The staple foods are taro root, sweet potato, yam, coconut, bread fruit, and banana. Pottery, unknown except through Fijian contact in Tonga, was replaced by gourds and carved wood bowls, cooking being effected by hot stones. In the absence of metals, implements were of shell, wood, or stone. Bark-cloth, tapa, was made from the paper-mulberry, and mats from plaited strips of pandanus and other leaves. Featherwork excelled in Hawaii. Tattooing of the limbs of both sexes was formerly effected by bone implements with serrated edges. In the Tonga group nose-flattening was practised.

Society was based upon noble, free, and servile classes, the last representing the indigenous populations. The prerogatives of the nobles were guarded by a taboo system, maintained by a priesthood, which also practised divination and ordeals. Pantomimic dancing survives in such forms as the Samoan siwa, or sitting dance, and the Hawaiian hula. The copious mythology includes tales of cosmic deities and culture-heroes, with creation legends emanating from the Indian cradleland. The Polynesian dialects form a sub-family of the Austronesian division of the Austro family of languages. See Areois; Ethnology; Kanaka; Maori; Taboo.

Bibliography. Maori and Polynesian, G. M. Brown, 1907; Hawaii, S. P. Smith, 3rd ed. 1910; Islanders of the Pacific, T. R. St. Johnston, 1921; Savage Civilization, T. Harrison, 1936; Religion and Social Organization in Central Polynesia, 1937; The Pacific Basin, G. L. Wood, 1942.

Polyp (Fr. *polype*, octopus). Name applied to a certain type of animal of the phylum Coelenterata (*q.v.*). It takes the form of a hollow tube-like bag containing only one internal body cavity or set of cavities, which communicates with the exterior only by the mouth. The common hydra (*q.v.*) of British ponds is a familiar example. But a more widely quoted example is the coral, details of which are given under the headings Coral; Coral Reef.

Polyperchon OR **POLYSPERCHON**. One of the generals of Philip of Macedon and Alexander the Great. Nominated governor of the Macedonian empire by Antipater, 319, he found himself opposed by the latter's son Cassander, and others. Twice obliged to leave Macedonia, Polyperchon attempted to form an independent kingdom in Peloponnesus. Having espoused the cause of Heracles, the son of Alexander, he afterwards put him to death at the instigation of Cassander, who entered into negotiations with him. Cassander afterwards failed to carry out the terms of the agreement, and Polyperchon, his reputation ruined by the murder of Heracles, spent the remainder of his life in Locris.

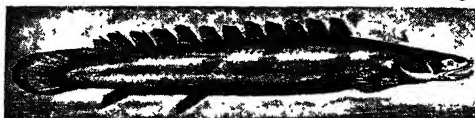
Polypase. In electricity, term describing the generation, transmission, or utilisation of alternating currents in more than one circuit or phase, each current rising and falling in potential at regular intervals, one after the other. A single-phase alternator with a single winding produces a rapidly oscillating current which rises and falls, reversing in polarity many times in a second. Graphically the current takes the form of a sine-wave moving above and below a central zero line. A three-phase alternator has three windings spaced 120° apart, in each of which an A.C. is induced in turn. These can be shown graphically by three sine-wave curves, the crests of each following the other one-third of a period apart. Three times more power can be transmitted over three conductors in the form of three-phase A.C. than over two conductors in the form of single-phase. Also three-phase A.C. motors are self-starting, whereas single-phase A.C. motors need special windings. Two-phase A.C. is used to only a limited extent. Six- and twelve-phase A.C. is used for rectification to D.C.

Polyphemus. In Greek mythology, one of the Cyclopes, a race of giants. The son of Poseidon and Thoösa, daughter of the sea-deity Phorcyas, he dwelt on the coast of Trinacria (Sicily), where he kept his flocks. In the course of his wanderings, Odysseus and his comrades sought refuge in the cave of Polyphemus, who killed and ate some of the companions of the hero. When the giant had gone to sleep, however, Odysseus destroyed the sight of his one eye by piercing it with a burning pole, and escaped from the cave with the remainder of his comrades. See Cyclopes.

Polyphony (Gr. *polys*, many; *phōnē*, sound). Style of music in which the constituent voices or instruments pursue their own individual courses and preserve a distinct melodic interest. It thus differs from the monodic or homophonic style, in which most of the parts are simply accompanimental to the principal melody. A fugue or a canon is necessarily polyphonic; other forms of music may or may not be so, according to the desire of the composer. See Harmony; Music.

Polyploidy. Term used in cytology and genetics to describe the condition in nuclei which contain more than the normal pair of sets of chromosomes. Triploids contain three sets, tetraploids four, and so on. Various causes lead to the condition, among them the failure of meiosis so that diploid gametes are produced. Fusion of one of these with a normal haploid gamete would result in a triploid individual; with another diploid gamete, in a tetraploid one.

Polypodiaceae. Large family of Pteridophytes. It includes the greater number of fern genera, and is of world-wide representation. With few exceptions they are perennial herbs with leaves or fronds of a tough texture, simple, or more or less divided. The spores are borne in minute stalked capsules, partially girt by a vertical ring. These are clustered in dots or lines on the back of the frond. The frond before expansion is rolled up with the tip in the centre of the coil.



Polypterus, the African mud-fish, showing dorsal fin broken into small finlets

Polypody (*Polypodium vulgare*). Fern of the above family Polypodiaceae. A native of Europe and the N. temperate zone, it has a fleshy rootstock, with a furry coat of pale brown lance-shaped scales, which creeps on the surface of tree-trunks, walls, and hedge-bottoms. The leathery fronds are cut into lobes from the sides, and their stalks are jointed to the rootstock in such a way that they can be thrown off when old. They are produced singly at short intervals along the rootstock, and remain fresh and green throughout the winter. The golden-orange clusters of spore-cases are produced in double rows on the back of the lobes. The rootstock was formerly

employed as a purgative and for whooping cough. See Fern.

Polyporus. Large genus of fungi of the family Hymenomycetaceae. It has spores borne in mi-



Polyporus. *P. squamosus*, a bracket-shaped species on a tree trunk

nute tubes which are sunk into the underside of the cap or pileus. The substance of the pileus is corky or woody. They mostly grow upon living or dead wood—trunks, branches, or roots of standing trees or worked wood. Those that grow from the trunks usually take the form of brackets. These are only one phase of the plant's growth. The vegetative phase takes the form of delicate threads (mycelium) permeating the tissues of the wood and destroying them. Many of the species are highly destructive to growing timber. See Forestry.

Polypterus. Genus of mud-fishes, found in the rivers of Africa. The dorsal fin is broken up into a series of small finlets arranged in a row along the back, and the body is covered with large plate-like scales. It grows to about four

ft. long, is carnivorous in diet and nocturnal in habit. See Fish.

Polypus. Tumour growing from mucous membrane, usu-

ally more or less pear-shaped, and attached by a stalk to the surface from which it grows. It consists of fibrous tissue covered with epithelium, and is inflammatory in origin. Polypi are most frequently met with in the nose, bladder, rectum, or uterus. They rarely become malignant, i.e. cancerous in nature. If the growth is accessible, it is as a rule easily removed by surgical means.

Polytechnic (Gr. *polys*, many; *technē*, art). Term applied to any institution affording practical training in the arts and sciences. Such institutions are known also as technical high schools. The term was first used in connexion with the École Centrale des Travaux Pub-

lics, established in Paris by the National Convention in 1794, and known since Sept., 1795, as L'École Polytechnique. Frequently reorganized, it has been ever since devoted to engineering. The first London polytechnic, the Royal Polytechnic Institution, 309, Regent Street, and 5, Cavendish Square, opened Aug. 6, 1839, was devoted to the exhibition of new inventions and lectures, a popular feature being a diving-bell. In 1881 the premises became the home of the Polytechnic Young Men's Christian Institute, founded by Quintin Hogg (*q.v.*). Now known as the Regent Street Polytechnic, its educational courses and equipment receive material aid from the L.C.C. technical education board and the city parochial charities. Other London polytechnics include Battersea, Borough, Chelsea, and Woolwich.

The work carried on by means of day as well as evening classes at these polytechnics embraces both theoretical and practical training in class-rooms and laboratories, while at most of them is a department for the teaching of domestic economy to girls and women. Similar institutions exist in other cities of the United Kingdom, in Germany, Austria, Switzerland, and the U.S.A., where the parent foundations, the Rensselaer Polytechnic Institute, Troy, and Franklin Institute, Philadelphia, date from 1824. *Consult* Histoire de L'École Polytechnique, G. Pinet, 1886.

Polytheism (Gr. *polys*, many; *theos*, god). Belief in, and worship of, many gods. Opinion is divided on the question whether polytheism preceded, or was a degradation of, monotheism. It figured in the ancient history of the Hebrews, characterised the religions of Assyria, Babylonia, Egypt, Greece, and Rome, and affected the pantheism of India. *See* Anthropomorphism; Deism; Monotheism; Pantheism; Religion.

Polyuria. Increase in the amount of urine passed. It may be due to natural physiological processes, *e.g.* increase in the amount of food and liquid taken; to exposure to cold, which reduces transpiration by the skin; or to disease, most frequently diabetes and Bright's disease.

Polyxena. In Greek legend, the daughter of Priam, king of Troy, and beloved of Achilles. After the taking of Troy, Polyxena was taken captive by Neoptolemus, the son of Achilles, and when on the return journey, on the Thracian coast, the shade of Achilles ap-

peared, and demanded that Polyxena should be sacrificed to him, Neoptolemus immolated the unfortunate maiden. The incident is dramatically treated in the Hecuba of Euripides.

Polyzoa (Gr. *polys*, many; *zōon*, animal). Name applied to a zoological phylum of minute animals, mostly marine, which live in colonies. The sea-mats, *e.g.* *Flustra*, common on sandy shores, and often mistaken for sea-weeds, are familiar examples. The colonies assume many forms, some being tree-like, others leaf-like, while others form incrustations on rocks and sea-weeds. The animal is of simple structure, consisting mainly of a U-shaped alimentary canal, terminating in a mouth and an anus placed near together. The mouth is surrounded by a ring or horseshoe of tentacles, covered with minute cilia, the waving of which causes currents in the water and so sweeps particles of food into the mouth. In these colonies the individuals are specialised to perform various functions for the common benefit, some being feeding agents, some reproductive, and others being armed.

Pomade (Lat. *pomum*, apple) or **POMATUM**. Name given to any scented grease or ointment used for the hair or skin. It was formerly made from the juice of apples.

Pomander (Fr. *pomme d'ambre*, amber apple). Scented ball or box hung at the end of the girdle, round the neck, or carried in the pocket. Pomanders became obsolete at the end of the 17th century.

Pombal, SEBASTIÃO JOSÉ DE CARVALHO E MELLO, MARQUESS OF (1699-1782). Portuguese states-



man. Born at Lisbon, May 13, 1699, of good family, he became Portuguese ambassador in London, 1739-45, and Vienna, 1745-49. Recalled to Portugal, he became principal minister of Joseph I, Aug., 1750, carrying out many internal reforms, and strengthening the position of Portugal abroad. He crushed a revolutionary plot among the nobles and Jesuits in 1759, and in the same year expelled the Jesuits from Portugal and her colonies.

On the accession, in 1777, of Queen Maria, he resigned his offices. Much of his action was reversed, and he was severely censured and banished from the court. He died at Pombal, May 8, 1782. *Consult* Dictator of Portugal, M. Cheke, 1938.

Pome (Lat. *pomum*, apple). In botany, a succulent fruit with a fleshy body, such as that of the apple, pear, etc., the seeds of which are enclosed in carpels forming the core. *See* Fruit.

Pomegranate (*Punica granatum*). Tree of the family Punicaceae, native of W. Asia. The leaves are oblong or lance-shaped, and the red flowers are in small clusters at the ends of the branches. The large fruits, golden tinged with red, are remarkable in their structure, there being two series of carpels, one above the other. The seeds are coated with sweet, juicy pulp. The rind is used for tanning morocco leather, to which it gives its rich red colour.



Pomegranate. Flower, leaves, pulp. The rind is used for tanning morocco leather, to which it gives its rich red colour.

Pomerania. Former province of Prussia, Germany, between Brandenburg and the Baltic. Its area was 11,680 sq. m., and its pop. almost 2,000,000. It was divided into two parts by the Oder and included the islands of Ruegen, Usedom, and Wollin. It was remarkable for its many lakes, and was important to German economy as a centre of agriculture and fishing.

Pomerania was inhabited about the 8th century by people of Slavonic race, and about 1200 their rulers called themselves dukes. It became part of the German kingdom, and at one time included Pomerellen, a province of the former West Prussia. This, however, was separated from Pomerania proper about 1300. The dukes of Pomerania divided and subdivided their lands to provide for various branches of the ducal family. In 1625, however, it was united under a single duke, and in 1637, on his death without sons, it was claimed by Brandenburg, in accordance with a treaty made some years before. The Swedes, however, were in possession, for the Thirty Years' War was raging, so in 1648 it was divided; Brandenburg secured eastern, and Sweden western, Pomerania.

The rulers of Brandenburg lost no chance of claiming the whole province, and in 1720 most of Western

Pomerania was handed over by Sweden. In 1815 the rest also became part of Prussia. After the Second Great War, the part W. of the Oder lay in the Russian zone of occupation in Germany; the part E. of the Oder was placed by the Potsdam agreement, Aug. 1945, under Polish administration, the bulk of the German pop. being expelled.

Pomeranian Dog. Breed of pet dog. It is bred largely in Germany, where it is known as the Spitz and



Pomeranian Dog. A champion specimen of the breed

is claimed as one of the national breeds. In general appearance the Pomeranian recalls a diminutive chow or Eskimo dog, and is doubtless descended from one or more of the Arctic breeds. In its original and large form, a breed now little known, the Pomeranian was used as a wolf dog. It has been used abroad as a sheep dog, but in Great Britain the diminutive type only, bred by special selection, is seen, still sometimes kept as a lady's pet in spite of its rather uncertain temper and uselessness as a house dog. Specimens of these once-fashionable dogs weighed 8 lb. and less; the favourite colour was black, but white and fawn, sometimes mixed, were frequently seen; the ears should be erect, with no tendency to curl at the tips. See Dog, colour plate.

Pommel Cheese. One of the most popular cream cheeses, made in France and largely used in

England in normal times. It is unsalted, does not keep long, and is made from cream and milk thickened by souring.

Pommer, ERICH (b. 1889). German film director. One of the cinema's pioneers, he entered the film industry before the First Great War when he worked for the French Gaumont Co. in Berlin during 1907-14. During the 1920s he worked as a director for U.F.A., achieving world-wide fame by such pictures as *Nibelungen*, *Vaudeville*, and *Waltz Dream*. With Charles Laughton in the U.S.A. he founded the film company Mayflower Pictures, Ltd., and directed *Vessel of Wrath*, 1938; *They Knew What They Wanted*, 1940. His best-known British film was *Fire Over England*, 1936.

Pomona. In Roman mythology, a nymph or goddess who was the patroness of gardens and fruit.

Pomona OR **MAINLAND.** Largest of the Orkney Islands, Scotland. Its area is 150 sq. m. It is divided into two unequal portions by Kirkwall Bay and Scapa Flow (*q.v.*), and has a steep rocky W. coast, with a few good harbours. The surface is mainly moorland and heath, with some fertile valleys. Kirkwall and Stromness are the only towns. "Maes Howe," a chambered barrow, and the Standing Stones of Stenness, a group of stone circles, are interesting antiquities. Pop. 14,083.

Pomona. City of California, U.S.A., in Los Angeles co. Situated 34 m. by rly. E. of Los Angeles, and served by the S. Pacific rly., it lies in an important fruit and vegetable district, and carries on a large trade in oranges. Pomona was settled in 1875 and incorporated 1887. Pop. 20,804.

Pompadour, JEANNE ANTOINETTE POISSON, MARQUISE DE (1721-64). Mistress of Louis XV. Born in Paris, Dec. 29, 1721, she was the illegitimate daughter, by Madeleine Poisson, of Le Normant de Tournemont, whose

nephew, Le Normant d'Étiolles, she married in 1741. She became mistress of Louis XV in 1745, and

thenceforth, a woman of high talents and with great ambition, exercised much political influence. She accumulated a large fortune for herself and her relatives, became a duchess, 1752, and lady-in-waiting to the queen, 1756. She personally carried out many of the king's state duties, and her patronage of writers and artists such as Voltaire, Crébillon, Quenay, Helvétius, Van Loo, and Boucher enhanced her influence. The French alliance with Austria, 1756, was due to her personal spite against Frederick II. She died at Versailles, April 15, 1764. *Consul* Mme. de Pompadour, E. and J. de Goncourt, new ed. 1896; Mme. de Pompadour, H. N. Williams, 1902.

Pomp and Circumstance. Title of five marches composed by Elgar: Nos. 1 and 2 in 1901; No. 3 in 1905; No. 4 in 1907; No. 5 in 1930. In 1902 the trio portion of No. 1 was adapted by the composer as a setting for A. C. Benson's words, *Land of Hope and Glory* (*q.v.*), as the official Coronation Ode.

Pompeia. Name of a Roman plebeian gens, or clan, the most important member of which was:

GNÆUS POMPEIUS (106-48 B.C.). Roman general and triumvir. Commonly known as Pompey the Great, he received from Sulla, as the reward of his military achievements, the surname of Magnus, a title which descended to his sons. He was born Sept. 30, 106 B.C., of a family which in the great strife between the democratic and the aristocratic parties in Rome, took the senatorial side. In 89 young Pompey was already serving with the army under the command of his father. He became so popular with the soldiers that, when Sulla landed in Italy in 84, determined to overthrow the dominant democratic faction, Pompey was able to lead a considerable force to support him. Sulla gave him responsible employment, and during the next three years he rendered brilliant services, especially in the overthrow of the Marian, or democratic, party in Africa. These were the triumphs which caused Sulla to hail him as Magnus, the Great. After Sulla's death in 78, Pompey remained a recognized leader



Marquise de Pompadour, mistress of Louis XV

From the portrait by Boucher in the Wallace Collection, London



Pompey the Great, Roman general
From a bust

of the senatorial party, whose armies he commanded in Spain 76-71.

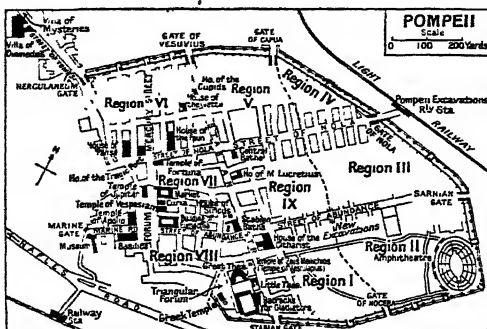
Returning to Rome, he broke with his former allies, and in 67 was appointed with extraordinary powers for the suppression of the pirates in the Mediterranean. In this task he was completely successful, and in 66 he was sent to the E., again with extraordinary powers, primarily to overthrow Mithradates (*q.v.*). Again he was successful, and brought the entire east under the Roman sway.

After the year 62 his hitherto brilliant record became one of failure. Since now he would neither give way to the senate nor seize absolute power, he formed an alliance, known as the first triumvirate, with Crassus and Julius Caesar. In 58 Caesar took up the proconsulship or governorship of Gaul, an office which, by means of the armies at his disposal, he was able to use as a step towards making an ultimate bid for supreme power. Pompey, remaining in Rome, rapidly lost influence. In 52 the government broke down altogether, and again Pompey had his chance. He again hesitated, lost his opportunity, and threw himself upon the support of the senatorial faction. The result was the invasion of Italy by Caesar at the head of his preconsular army in 49, the decisive defeat of Pompey at Pharsalus, Aug. 9, 48, and his flight to Egypt, where he was assassinated, Sept. 29. *Consul's Life*, Plutarch; *Seven Roman Statesmen*, C. W. C. Oman, 1902

Pompey's younger son, Sextus Pompeius Magnus (d. 35 B.C.), escaped from the battle of Munda (45 B.C.), and for some time lived in retirement in Spain. In the second civil war he emerged from retirement and, collecting a powerful

fleet, seized Sicily and seriously interfered with the supply of grain to Rome. In 36 the fleet of Pompeius was severely defeated. Its leader fled, but eventually was captured in Asia and put to death.

Pompeia. Wife of Julius Caesar, by whom she was divorced in 61 B.C. While the mysteries of the Bona Dea were being celebrated in her house, the profligate Clodius succeeded in gaining entrance disguised in woman's clothes. There

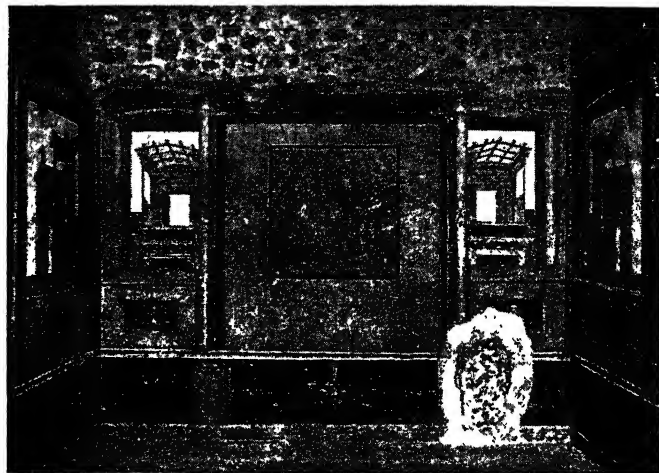


Pompeii. Plan of the ruins of the ancient Roman city

was no real evidence of any intrigue between Pompeia and Clodius, but Caesar divorced Pompeia on the grounds that "Caesar's wife must be above suspicion."

Pompeii. Ancient city of Campania, Italy. Its ruins lie $1\frac{1}{2}$ m. from the sea, at the S.E. foot of

to leave paintings, household goods, etc., in their original setting. In the Second Great War the R.A.F. dropped 156 bombs on the amphitheatre, which was used by the Germans as an encampment. The damage caused to the antique remains was not serious.



Pompeii A room showing Pompeian decoration in the form of mural paintings suggesting open windows and raised columns

Mt. Vesuvius, 15 m. by rly. E.S.E. of Naples. Founded by the Oscans, it was partially Hellenised, conquered by the Samnites, and taken from them by the Romans in 290 B.C. Having joined the Italian revolt in 90, it was made a Roman colony in 80 B.C. A small but flourishing town and seaport, it became a pleasure resort of wealthy Romans. Wrecked by an earthquake, A.D. 63, it was hastily rebuilt, though many of its buildings were still ruinous when it was overwhelmed by the great eruption of Vesuvius, Aug. 24, 79. A hail of small pieces of pumice-stone covered the town to a depth of 8 to 10 ft. and was followed by a fall of ash. Sulphurous fumes suffocated many of about 20,000

The city, built on a low hill of lava, stood at the mouth of the river Sarnus. The walls, with towers and eight gates, enclosing an irregular oval, are nearly two miles long, but had been pulled down on the sea side. The streets are narrow, generally straight, and paved with lava. Of the two *fora* or market-places, the larger is surrounded on three sides by a colonnade, and facing it are the principal temples, the municipal buildings, the *maxellum* or provision market, and other public edifices. The smaller, or triangular forum, contains scanty remains of a Greek temple. Near it are two theatres and the gladiators' barracks. At the E. end of the city is an amphitheatre.

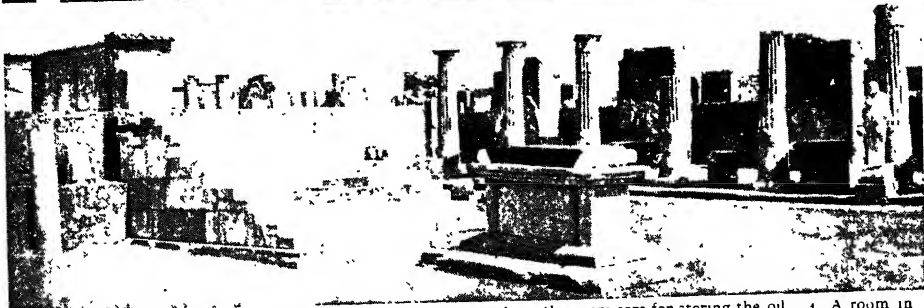
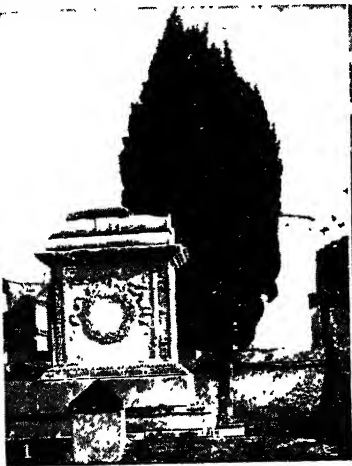


Sextus Pompeius
From a statue in the
Louvre, Paris

inhabitants some 2,000 perished.

In 1748 the discovery of some statues led to the exploration of the site. Desultory search gave place to systematic excavation, but only since 1861 has this been scientifically prosecuted.

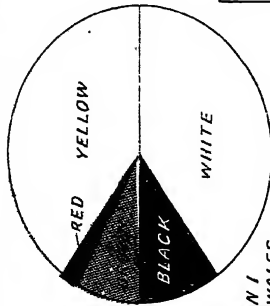
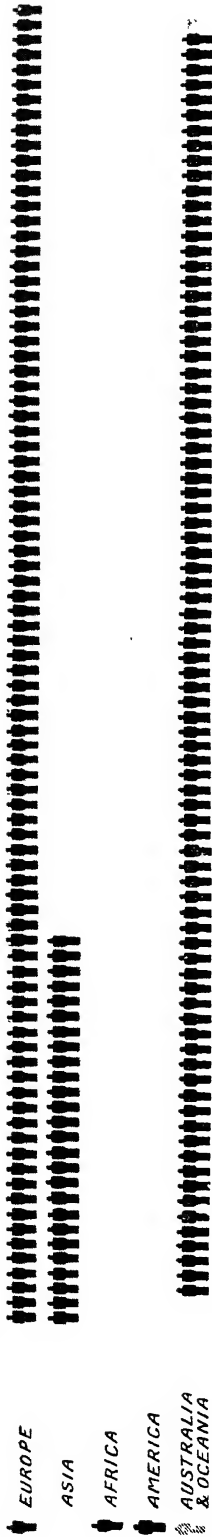
Recent excavators have tried



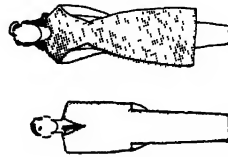
1. Sepulchres in the Street of Tombs. 2 The Street of Abundance, so called as the centre of the jewellers. Note the stepping stones across the roadway, and the square public fountain beyond. 3. An oil merchant's shop,

with earthenware jars for storing the oil 4 A room in the baths, showing niches for depositing clothes. 5. Peristyle and inner court of Pompeian house. 6. Temple of Isis. 7. Inner shrine of the Temple of Venus or of Apollo

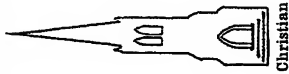
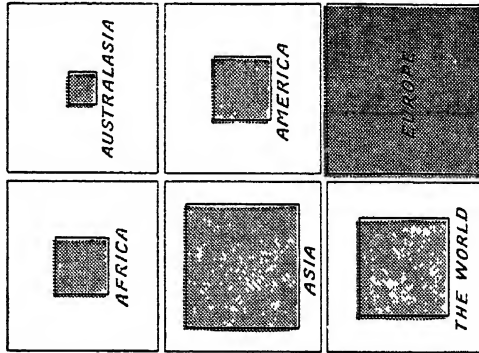
POMPEII: EXCAVATED REMAINS OF THE CITY OVERWHELMED BY VESUVIUS



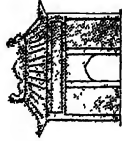
Left: Proportionate populations of the four countries of the U.K.
Below: Figures showing proportion of male and female pop. of the U.K.



The lines of coloured figures above show the entire population of the world by continents. Each figure represents 5 million people. The pink and yellow squares below show the population density of the world and the continents on a European basis. As indicated: Comparative numbers of white, yellow, black, brown, and red races



Christian



Confucian



Hindu



Mahomedan



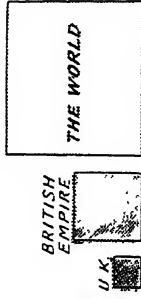
Buddhis



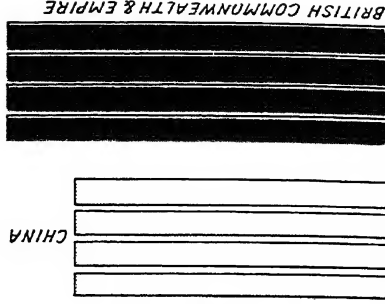
Taoist



Shintoist

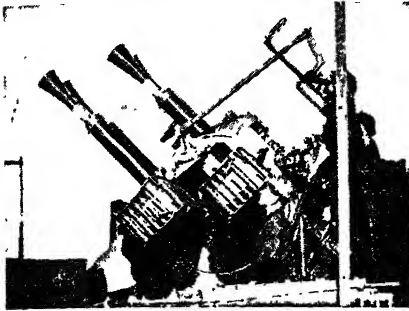


The height of the buildings shown below illustrates the proportionate distribution of adherents to the chief religions of the U.K. and the British Commonwealth and Empire, and the world



The vertical coloured bars illustrate the relative populations of the chief countries of the world and the British Commonwealth and Empire

POPULATION : DIAGRAMS ILLUSTRATING DISTRIBUTION, DENSITY, RACES, AND RELIGIONS



Pom-pom Anti-aircraft gun used against dive bombers

There are three *thermae*, or public baths, and without the city walls are two streets of tombs. The most interesting remains are private houses, which illustrate with extraordinary vividness the life of all classes. Their outer walls are generally blank or faced by shops, but within the larger houses are courts and gardens, and avishly decorated rooms.

Pompeian decoration is a term applied chiefly to paintings discovered in the ruins of Herculaneum and Pompeii, but also to decorations in the same style and period unearthed in Rome. The style is derived from Alexandrian art, its principal characteristics being gaiety of colour and a Greek gracefulness in design. Bright reds, blues, and yellows predominated. The paintings were on stuccoed walls, and represented mythological beings, landscapes, and studies from bird or plant life. Fantastical architectural motives were often woven into the design. See Io; Iphigenia; Issus; Lytton. 1st Baron.

Bibliography. Pompeii, T. H. Dyer, 1867; Buried Cities of Vesuvius: Herculaneum and Pompeii, J. F. Horne, 1895; Pompeii Its Life and Art, A. Mau, Eng. trans. 1902; Pompeii R. C. Carrington, 1936

Pompey. English form of the Latin name Pompeius, specially applied to Gnaeus Pompeius, called Pompey the Great. See Pompeia.

Pompey's Pillar. Monument at Alexandria, Egypt. It was set up in 302 in honour of the emperor Diocletian. A red granite column with a Corinthian capital, it is 99 ft. in height. The name is due to a mistaken idea that it marked the site of Pompey's tomb. See Alexandria illus.

Pom-pom. Small calibre cannon in which the shells are loaded and fired, and the empty cases ejected, by automatically operated mechanism. These guns were used

by the Boers in the South African War, and in the later stages by the British troops. The shells weigh about 1½ lb., the smallest explosive projectile permitted under the Geneva convention. Usually the shells are fed in belts of 25 for the Maxim and clips of 8 for the Hotchkiss. In 1936 the Royal Navy introduced a multiple pom-pom for defence against torpedo-dropping aircraft. It consists of a nest of 4-8 barrels mounted and fired as one gun; the eight have a total rate of fire of 1,200 2-lb. H.E. shells per minute, and the effective range is 400 yds. Popularly known as the Chicago piano, the multiple pom-pom was mounted on all warships and many merchantmen in the Second Great War. The name is derived from the noise caused by projectiles bursting in rapid succession. See Gun; Machine-Gun.

Ponapé. Chief of the Caroline Islands, Pacific Ocean, formerly under the mandate of Japan. Off the shore, beyond an islet-dotted lagoon about 1½ m. across, is a barrier reef. The soil is very fertile. Its area is 340 sq. m. Turned into a base by the Japanese during the Second Great War, Ponapé was frequently bombed by both carrier- and land-based U.S. bombers during Feb.-May, 1945, and was bombarded by U.S. warships May 1. No landing was made, however, the Japanese troops here surrendering Sept. 2. Pop. 11,467. See Caroline Islands.

Ponce. Town of Puerto Rico The second largest town of the island, it lies 3 m. from its harbour, Playa de Ponce on the S. coast, and 81 m. S.W. of San Juan, with which it has rly. connexion. It manufactures lace cigars, and hats, and exports copra, coffee, sugar, tobacco, and fruits. Pop. 105,116. Pron Pon-say.

Ponce de Leon, JUAN (c. 1460-1521) Spanish explorer. Born at San Servas Leon, he accompanied Columbus to America

1493, in 1510 was appointed governor of Porto Rico, and in 1513, voyaging N., discovered Florida. After cruising along the coast he visited the Bahamas and then made his way to Spain, where he procured a grant for the colonisation of Florida. He was killed whilst attempting to establish his colony there in 1521.

Ponce de Leon, Luis (1527-91) Spanish poet. After studying at Salamanca he became professor of theology in the university, 1561. Charged with heresy by the Inquisition in 1572, he was imprisoned for four years, being then reinstated as a professor. He died Aug. 23, 1591, within a few days of becoming vicar-general of his order. His most famous work was the mystical Of the



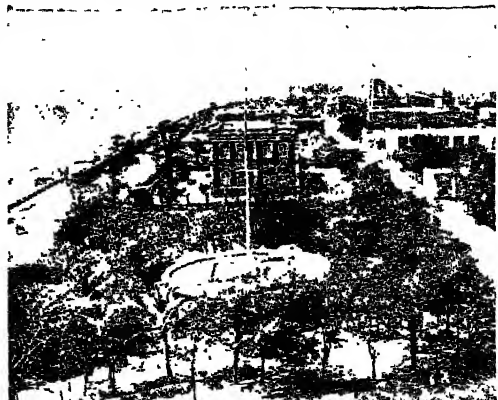
Poncho, as worn in the Argentine

Names of Christ, published 1583-85. His poems were issued by Quevedo in 1631.

Poncho. Cloak worn by men in Peru, Chile, Argentina, and other parts of S. America. It is a wide strip of cloth with a slit in the middle through which the head is passed, so that while it protects back and front it leaves the arms free.

Pondharpur OR PANDHARPUR. Town of India, in Sholapur dist., Bombay state. It is on the Bhima, a tributary of the Kistna, 84 m. E. of Satara. Thousands of pilgrims visit the temple of Vithoba. Pop. 33,329.

Pondicherry OR PONDICHÉRY. Seaport and town of India, belonging to France, capital of the province of the same name. It stands



Pondicherry General view showing, on the left, the Roadstead and Marina

on the E. coast, 85 m. S. of Madras, and is divided by a canal into a European and a native town. There is a considerable trade with France and elsewhere, and the town has some manufactures, three cotton mills being situated there. The capital of a district, 115 sq. m. in extent, which belongs to France, Pondicherry was founded by a Frenchman in 1674. The buildings include government house, the hôtel de ville, and the cathedral. Taken by the Dutch, it was restored in 1697. The British captured it in 1761, 1778, 1793, and 1803, but each time it was restored when peace came. On Sept. 9, 1940, Pondicherry rejected the Vichy govt. and declared for Gen. de Gaulle. The port was developed into a base for Allied naval craft operating against Japan. Pop. 53,101, the largest French town in India. Pop. of prov., 204,653.

Pondoland. Country forming one of the Transkeian Territories of the Cape Province, British S. Africa. It stretches along the coast, S.W. of Natal. British sovereignty was proclaimed in 1878 over the tidal estuary of the St. John's river and the country was annexed to Cape Colony in 1894. The inhabitants, the Pondos, number about 234,000. The area is 3,906 sq. m.

Pondweed (*Potamogeton*). Genus of aquatic herbs of the family Potamogetonaceae. They are na-



Pondweed. Frond of curled variety, *Potamogeton crispus*

tives chiefly of temperate regions. They have submerged, translucent or floating, opaque leaves, and simple flowers in spikes.

Poniard (Lat. *pugnus*, fist). Term used for a small dagger. It usually refers to a slender weapon of this kind, introduced from France, having a triangular or square blade, and used for stabbing at close quarters. See Dagger.

Poniatowski. Name of a famous Polish family. Stanislas Poniatowski (1677-1762) was in



Count Stanislas Poniatowski

the service of Charles XII of Sweden, and afterwards held high positions in Lithuania and Poland. One of his sons, Stanislas, became king of Poland; another, Michael, became archbishop of Gnesen. The family became extinct when Stanislas, a grandson of the earlier Stanislas, died in 1833, but a natural son, Joseph (1816-73), carried on the name. He became a prince in Tuscany and in Austria, and was for many years the envoy of Tuscany in Paris. He passed his last years in England, where he shared the exile of his friend, Napoleon III.

Poniatowski, JOSEPH ANTON, PRINCE (1762-1813). Polish soldier. Born May 7, 1762, he entered the Austrian army. In 1789 he became a general in the Polish army, and in 1791 was commander-in-chief of the operations against Russia. Disgusted at the terms of the treaty which concluded the war, he went into retirement. War minister of the duchy of Warsaw, he resisted the Austrian invasion of 1809, in 1812 commanded a corps in Napoleon's Russian campaign, and remained in the emperor's service until his death after the battle of Leipzig, Oct. 16-19, 1813. He had just been made a marshal.

Ponnani. Harbour of Madras province, India, on the Malabar coast. It is situated at the mouth of the Ponnani river. A road joins it to Tirur on the rly., and continues to Mysore. Pop. 18,000.

Ponsard, FRANÇOIS (1814-67). French dramatist and academician. Born at Vienne, June 1, 1814, he abandoned law for literature, publishing a translation of Byron's Manfred in 1837, and specialising in the drama. Aided by the consummate acting of Mme. Rachel, his Lucrèce, 1843, scored an immense success, but Ponsard is remembered chiefly for his admirable comedy of manners, L'Honneur et l'Argent. He died in Paris, July 7, 1867.

Pons Asinorum (Lat., asses' bridge). In geometry, name popularly given to the fifth proposition

of the first book of Euclid, from the supposed difficulty of beginners in understanding it. The proposition states that the angles at the base of an isosceles triangle are equal. See Geometry.

Ponsford, WILLIAM HAROLD (b. 1900). Australian cricketer, born at N. Calton, Melbourne. Oct. 19, 1900. When he played an innings of 429 for Victoria



W. H. Ponsford, Australian cricketer

against Tasmania, 1922, and one of 437 against Queensland, 1927, each was at the time a record for first-class cricket. This opening batsman made more runs for Victoria than any other player. He played against England from 1924, achieving, with D. G. Bradman, a world record partnership of 451 for the second wicket, at the Oval, 1934, in his last test match.

Ponsonby, ARTHUR AUGUSTUS WILLIAM HARRY PONSONBY, 1ST BARON (1871-1946). A British politician. Son of Sir Henry Ponsonby, private secretary to Queen Victoria, he was born Feb. 16, 1871, and went from Eton to Balliol College, Oxford. He was chosen after twelve years in the diplomatic service to be principal private secretary to Campbell-Bannerman during the latter's premiership, 1906-08, and succeeded him as Liberal M.P. for Stirling Burghs. He joined the Labour party in 1918, and represented it as M.P. for Brightside, Sheffield, 1922-30, being under-secretary for foreign affairs in 1924. Raised to the peerage in 1930, he was chancellor of the duchy of Lancaster next year, after which he led his party in the house of lords until 1935. He resigned from it in 1940, and died March 24, 1946. His son Matthew (b. July 28, 1904) succeeded to the title.

Ponsonby wrote The Camel and the Needle's Eye, 1909; English Diaries, 1923; Samuel Pepys, 1928; John Evelyn, 1934.

Pons Winnecke. Name of a periodical comet. First discovered by J. L. Pons in 1819, and re-



Lord Ponsonby, British politician

discovered by Winnecke in 1858, it has been seen at approximately six-year intervals since. One of the lesser sized comets, it belongs to the Jupiter family of comets, and its irregular appearances and change of orbit have been due to the gravitational pull of the planet. See Comet.

Ponta Delgada. Capital of St. Michael's, Azores Islands. It is a winter resort, and its harbour is protected by a breakwater nearly 3,000 ft. long. The commercial centre of the Azores, it manufactures cotton fabrics, pottery, straw hats, and spirits. Pop. of district, 156,045.

Ponta Grossa. Town of Brazil, in the state of Parana, 200 m. S.W. of São Paulo. It exports large quantities of yerba maté and timber through the port of Paranaguá and also produces beef, bananas, cattle, rice, and tobacco. It is the centre of a network of good motor roads. The Parana rly. connects it with Curitiba and the seaports of Antonina and Paranaguá. Another rly. runs to Rio Grande do Sul and São Paulo. Altitude 2,930 ft. Pop. est. 40,000.

Pont-à-Mousson. Town of France. In the dept. of Meurthe-et-Moselle, it stands on the Moselle at the foot of the Mousson Mt., 18 m. N.W. of Nancy. On a height to the E. are the ruins of the château. The Late Gothic church has interesting vaulting and a 16th century altar-piece. Needles, matches, plush, and velvets are made. The town, which once belonged to the counts of Bar, became a municipality in 1444 and the seat of a university in 1571. In the Franco-Prussian War it was important, as guarding a passage over the Moselle. It was shelled by the Germans intermittently during the First Great War. During the Second, the U.S. 3rd army advancing to the Moselle found the Germans in strength here Sept. 4, 1944. They withdrew, however, across the river, shelling the town as the Americans moved into it, and it was against fierce opposition by troops including fanatical S.S. and Hitler Youth detachments that the Americans forced a crossing below Pont-à-Mousson, Sept. 7. Heavy fighting continued in the area until Sept. 19. Pop. 10,239.

Pontarlier. Town of France. In the dept. of Doubs, it stands on the Doubs, in the midst of the Jura Mts., and on the Dijon-Neuchâtel-Lausanne rly., 26 m. S.E. of Besançon. It manufactures paper and clocks and trades in cattle,

cheese, and agricultural produce. In the fort de Joux, near the town, Mirabeau was imprisoned, 1775, and Toussaint l'Ouverture died a prisoner in 1803. Pontarlier was burned by the Swedes in 1639. Pop. 12,722.

Pontchartrain. Salt-water lake in Louisiana, U.S.A. It is situated in the S.E. part of the state, about 6 m. N. of New Orleans, and measures about 37 m. by 23 m.

Pont du Gard. Aqueduct of France. Spanning the Gard above Remoulins, it is one of the finest Roman structures in existence. It was built over the valley to conduct the waters of the Eure and Airon to Nîmes. The bridge is 880 ft. long and 160 ft. high, and consists of three tiers of arches composed of massive stones without cement. Damaged in the 5th century, it was restored between 1855 and 1858. See Aqueduct, illus.; Nîmes.

Pontecorvo. City of Italy, in the prov. of Frosinore. It stands on the left bank of the Garigliano, 39 m. N.W. of Capua and 5 m. from Aquino station. It has a cathedral, several churches and convents, a castle, and a triumphal arch with a statue of Pope Pius IX. One of its churches was completely destroyed in the Second Great War. The city was included in the Papal States down to 1860. Napoleon gave the principality (scarcely 40 sq. m. in area) of Pontecorvo to Bernadotte in 1806.

Pontefract. Mun. bor. and market town of the W. Riding of Yorkshire, England. It is 8 m. E. of Wakefield, by rly. and is near the junction of the Aire and the Calder. The ruins of the Norman castle show it to have been one of unusual strength



Pontefract arms

and size. Part of it is now used as a museum, and the adjoining grounds have been made into a public recreation ground. The churches are St. Giles and All Saints. Two old foundations are Trinity Hospital and St. Nicholas's almshouses. The grammar school is a modern building, but the school itself is old. There is a town hall, court house,

market hall, and assembly rooms. Features of the town are an old hermitage cut out of the rock, and the windmill on St. Thomas's Hill, the eminence where Earl Thomas of Lancaster was executed. The industries include tanning, brewing, iron-founding, and corn-milling. Pontefract cakes (usually pronounced Pomfret cakes) made here are lozenges of liquorice. Much coal is mined near.

The original name of Pontefract was Kirkby, where a castle was built by the Normans. Soon the name was changed, and the town



Pontefract, Yorkshire. Ruins of the Norman castle, a part of which is still used as a museum

became important owing to its geographical position, and the fact that it was a stronghold of the dukes of Lancaster. In 1399 Richard II was murdered here. The castle was taken and retaken during the Civil War, after which it was destroyed. The borough rights began early, and soon the borough had a merchant guild, markets, and a mayor. The first charter was granted by Robert de Lacy in 1194, he being a descendant of the Lacy who received from William the Conqueror the honour of Pontefract. From 1621 to 1918 Pontefract had its own M.P.s, first two and then one. In 1948 it was again allotted a member. Race and other sports meetings are held in the town park. Market day, Sat. Pop. est. 23,796.

Pontevedra. Maritime prov. of N.W. Spain, facing the Atlantic ocean. It is bounded N. by Coruña, E. by Lugo and Orense, and S. by the Portuguese prov. of Minho. Densely populated, and largely mountainous, it yields timber and agricultural produce. The capital is Pontevedra, other towns being Vigo and Redondela. Area, 1,695 sq. m. Pop. 686,333.

Pontevedra. City of Spain. Capital of the prov. of Pontevedra, it stands near the mouth of the river Lerez, in the Bay of Pontevedra, 13 m. N.N.E. of Vigo, with



Pontevedra, Spain. Ruins of the church of the 13th century convent of Santo Domingo

a station on the Santiago-Tuy Rly. The river is here spanned by a twelve-arched Roman bridge, the Pons Vetus. Santa Maria la Grande is a Gothic edifice with a 16th century façade, while the church of San Francisco contains many beautiful tombs. To the west of the town, near to the road from Carril, are the ivy-clad ruins of the 13th century conventual church of Santo Domingo, including fine apses, beautiful arcades, and some interesting tombs. The town has a trade in agricultural produce and some small manufactures. The name is a corruption of the Latin *pons vetus*, old bridge. Pop. 29,500.

Ponthierville. River port on the Congo. It is 78 m. above Stanleyville (q.v.) by rail. S. of Ponthierville the Congo again becomes navigable as far as Kindu.

Pontiac. City of Michigan, U.S.A., the co. seat of Oakland co. It stands on Clinton river, 25 m. N.W. of Detroit, and is served by the Grand Trunk and other rlys. Chief industries are concerned with the production of motor cars. Settled in 1818, Pontiac was incorporated in 1837, and became a city in 1861. Pop. 66,626.

Pontiac (c. 1712-69). North American Indian chief. As chief of the Ottawas he assisted the French commander, Montcalm, against the British, and took part in the annihilation of Braddock's force in 1755. In 1763 he was leader in a conspiracy against the British garrisons in N. America, and unsuccessfully besieged Detroit for five months. He was murdered by an Indian of the Kaskaskian tribe in 1769. His story is treated in Sir

Gilbert Parker's novel, *When Valmond came to Pontiac*, 1895. *Consult* History of the Conspiracy of Pontiac, F. Parkman, 10th ed. 1896.

Pontifex (Lat., bridgemaker). Member of the most important college of priests in ancient Rome. The college was charged with the maintenance of the law in so far as it was bound up with religion, a special function being the supervision of the calendar. In the last period of the republic the *pontifices* were 15 in number, holding office for life; at their head was the *pontifex maximus*, whose office, of great dignity, was held under the empire by the emperor himself. When Christianity became the state religion the title was assumed by the popes.

Pontifical OR **ORDINARIUM.** Roman Catholic service book for the use of bishops or of priests specially empowered by bishops. Books of this kind originated in the 8th century; that in the national library of Paris is attributed to the 8th-10th centuries. They were compiled by bishops from old sacramentaries, etc., in the Middle Ages. The Roman pontifical was first printed in 1485; that in use was revised by order of Leo XIII. The Greek Church has its own pontifical. A bishop's vestments are called pontificals. See Hungary. *Consult* Pontificale Romanum, G. Catalani, 1738; Bibliotheca Ritualis, F. A. Zaccaria, 1776-81; Monumenta Ritualia, W. Maskell, 2nd ed. 1882.

Pontigny. Village of France. It stands on an island, formed by the Serain, in the dept. of Yonne, 11 m. N.E. of Auxerre. It is famous for its Cistercian abbey. Founded

in the 12th century, by Count Thibaud of Champagne, this was a refuge for both Becket and Langton, while here S. Edmund Rich was buried. Its Gothic church has been restored as a national monument, and there are other monastic remains.

Pontine Marshes. Reclaimed marshland tract of W. Italy. In Roman times it bore the name of Pomptinae Paludes. Now roughly coterminous with the prov. of Littoria (Littoria), it borders the Mediterranean coast between Cisterna on the N. and Terracina on the S. About 25 m. in length, its breadth varies between 6 m. and 11 m. In ancient times the district was well drained, with prosperous villages and farms, and was inhabited by the Volsci. After the subjugation of that people by the Romans, the drainage works fell into disrepair and it became a malarious waste. Appius Claudius tried to drain it when in 312 B.C. he drove the Apennine Way through it.

Various attempts have since been made to reclaim it, Pope Pius VI in the 18th century constructing huge drainage works. In 1899 a large sum of money was allotted by the Italian government for reclamation purposes, but little work was done until 1926. Then the fascist govt., with a view to making Italian food supplies independent of imports, initiated a vast scheme to turn the marshes into agricultural land. Canals were built and mountain streams diverted to prevent the land from again becoming waterlogged. By 1931 the land had been drained; swamps where the malaria-carrying mosquito had bred were filled in; work had begun on clearing woods and undergrowth. In 1934, when the scheme was more than half completed, the reclaimed Pontine Marshes became the new province of Littoria. Four towns, Littoria (Littoria), Pontina, Sabaudia, and Aprilia were established in what developed into one of the richest wheat-growing districts of Italy.

Ponting, HERBERT GEORGE (d. 1935.) British photographer. Educated at Preston grammar school and Wellington College, he went to California in 1900 and entered journalism, being correspondent for American newspapers in the Philippine campaign in 1901 and the Russo-



H. G. Ponting, British photographer

Japanese War. After making world tours with his camera, he was appointed photographic officer to Scott's Antarctic expedition of 1910 and obtained a remarkable collection of pictures. In 1918 he joined the Spitsbergen expedition as photographer. He published in 1921 an account of his experiences under the title *Great White South*, and in 1933 his record of Scott's expedition was made into a film, *90° South*, with running commentary by Ponting. Awarded the Polar Medal and the Royal Geographical Medal, he died Feb. 7, 1935. His photographs are used in Great Britain and the U.S.A. for educational purposes.

Pontivy. Town of France. In the dept. of Morbihan, Brittany, it stands on the Blavet, and the canal from Nantes to Brest, 30 m. N.N.W. of Vannes. The chief buildings are the church and the château, now a museum. Linen and paper are made; there is a trade in agricultural produce. The newer part of the town is known as *Napoléonville*; it was built by Napoleon to accommodate a great number of soldiers, because he wished to make the place a military centre. During the Second Great War it was in German occupation following the Franco-German armistice of June, 1940, until captured by the U.S. 3rd army Aug. 5, 1944, against little opposition. Pop. 10,878.

Pont l'Évêque Cheese. Product of Normandy. It comes to the market in the 4-inch squares, with a golden crust round a semi-hard substance. The curd is produced by rennet only, and is salted more than once during preparation. Made throughout the year, the cheese varies according to the seasonal richness of the milk.

Pont-Neuf. Oldest bridge over the Seine, Paris. Built 1568-1603, remodelled 1843-53, and again partly restored in 1886, it is 360 yds. long and 25 yds. in width. The equestrian statue of Henry IV dates from 1818, when it re-



Pontresina, Switzerland. General view of the village, with Roseg Valley and glacier in the distance. See page 6614

placed an earlier work of 1635, converted into cannon in 1792. The bridge was famous in the 17th and 18th centuries as a gathering place for showmen. See Paris.

Pontoise. Town of France. In the dept. of Seine-et-Oise, it stands at the junction of the Oise and the Viosne, 17 m. N.W. of Paris. The chief buildings are the churches of S. Maclou and Notre Dame. There are manufactures of chemicals, an agricultural trade, and some shipping on the Oise. Pontoise was founded by the Gauls, and was a fortified town under the kings of France. It became the capital of

the Vexin, and was taken and retaken several times. In the Second Great War, after being in German occupation from June, 1940, it was liberated in the rapid Allied advance from Paris to the frontier during the last days of August, 1944. Pop. 11,009.

Pontoon (Lat. *ponto*, punt, floating bridge). Flat-bottomed boat, particularly one of special design employed for military bridge-building. This type of bridge utilises the boats as piers, the superstructure forming the roadway being thrown across from boat to boat. It can be speedily erected and is particularly useful for crossing wide streams, as no foundations for the piers are required. Boat bridges have been used since the earliest times. Modern pontoons are usually made in two or three sections for convenience of transport. Boats about 21 ft. long carry a roadway ten ft. wide, the distance between boats being proportioned to the load the bridge is to carry. In the Second Great War, rubber pontoons were used by the German armies for bridging rivers during the invasion of France and the Netherlands in 1940. Pontoons later were generally replaced by the British-invented Bailey bridge (*q.v.*). See Bridge.

Pontoon. Popular English name for the card game more accurately called *Vingt-et-un* (*q.v.*).

Pontoppidan, HENRIK (1857-1943). Danish novelist and poet. Born at Fredericia, July 24, 1857, he was the son of a pastor, and was trained at Copenhagen polytechnic as an engineer. After a walking tour in Switzerland he published in 1881 *Clipped Wings*, a collection of



Pontoon. German troops of the Second Great War constructing a rubber pontoon to replace a bridge destroyed by Russians in their endeavour to obstruct the enemy's advance in the neighbourhood of Kiev

short stories; its immediate success decided him to adopt a literary career. His novels include



H. Pontoppidan,
Danish novelist

The Promised Land, 1892; Lucky Peter, 8 vols., 1898-1904; The Kingdom of the Dead, 1916, for which he was awarded the Nobel prize next year; A Winter's Journey, 1920. A play, Storeholt, was produced in 1913. Pontoppidan's work is characterised by a ruthless seeking after truth and has a background of almost morbid pessimism in its vivid portrayal of the peasants' sombre life. He died at Copenhagen, Aug. 22, 1943.

Pontremoli. City of Italy, in the prov. of Massa e Carrara. Situated on the river Magra, at the foot of the Apennines, it is 25 m. by rly. N.E. of Spezia. It contains a 17th century cathedral. There is trade in wine and olive oil. A republic in the 12th and 13th centuries, Pontremoli was captured by the French in 1495.

Pontresina. Village in the Bernina Valley at the foot of the Pis Languard, Upper Engadine, Switzerland, in the canton of Grisons. Situated at an alt. of 5,915 ft., 5 m. by rly. S. of Samaden and 4 m. E. of St. Moritz, it is a favourite tourist resort in summer and winter. The church of S. Maria has a wooden roof dating from 1497. Pop. 1,000. See illus. p. 6613.

Pontus. Ancient dist. of Asia Minor. Lying along the Black Sea, it was a monarchy about 400 B.C., and was a prosperous country, strong and independent, until its king, Mithradates the Great, was conquered by Pompey, 63 B.C. Part of it then became a Roman province, and the rest survived as a state under a native ruler until A.D. 63, when this, too, was taken by Rome. Amasia was the capital, and afterwards Pharnacia.

Pontypool. Urban dist. and market town of Monmouthshire, England. It is 8 m. N. of Newport, being served by rly. and by a canal which connects it with Newport. The buildings include S. James's church and the town hall. It stands on the border of the S. Wales coalfield, and the chief industries are coal mining, works for making iron and tin plate, and the manufacture of rayon yarn and glass. In the 17th century Thomas Allgood made

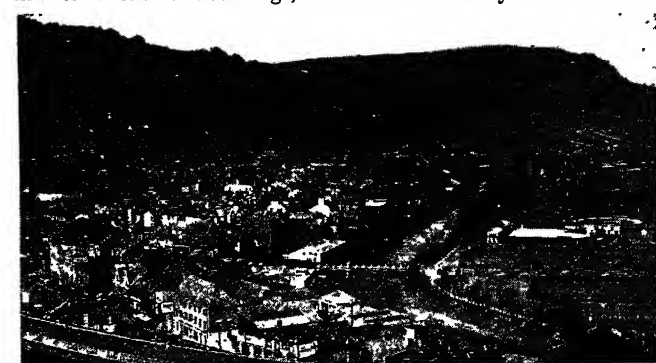
japanned wares here, and sheet iron was manufactured a little later. Market days, Wed. and Sat. Pontypool gives its name to a Welsh co. constituency. Pop. 42,000.

Pontypridd. Market town and urban dist. of Glamorganshire, Wales. It stands at the junction of the rivers Rhondda and Taff, 12 m. by rly. N.N.W. of Cardiff, and is the gateway to the Merthyr, Aberdare, and Rhondda valleys. The principal buildings in the town include S. Catherine's church, the municipal buildings, town hall, and free library. In the neighbourhood there are large coal and ironstone mines, and the chief industries are the manufacture of tin plate and iron goods, and the founding of iron and brass. An old bridge, dating from 1755, which crosses the Taff here is a single arch with a height of 35 ft. and a span 140 ft. Pontnewydd, the English equivalent of which is Newbridge, is



Pontypridd arms

several miles distant. Pontypridd's industry dates only from the 19th century. It gives its name to a co. constituency. Pop. 38,020.



Pontypridd, Glamorganshire. General view of this Welsh town and river Taff

several miles distant. Pontypridd's industry dates only from the 19th century. It gives its name to a co. constituency. Pop. 38,020.

Pony (Old Fr. *poulenet*, from Lat. *pullus*, young animal). Small type of horse, ranging in height from 8 to 14 hands. There is little doubt it is the oldest breed of domesticated horse. In many details the small, half-wild ponies of the Shetland Islands and Connemara show points of resemblance to Przevalsky's wild horse of Mongolia, and also with the sketches of horses found in cave dwellings.

Prehistoric remains have been found in Ireland, and it was abundant in Britain in the Bronze Age. The horses used by the ancient Britons for their war chariots ap-

pear to have been Celtic ponies. This Celtic breed is now found in its purest form in Iceland, but the ponies of the Faroë and Shetland Islands have undergone but slight modification. In their pure form these ponies lack the chestnuts on the hind limbs and the ergots on the fetlocks. They develop a heavy rough coat, and the mane and fore lock are remarkably luxuriant. Another peculiarity is that the hairs at the base of the tail are very stiff and stand out protectively on either side.

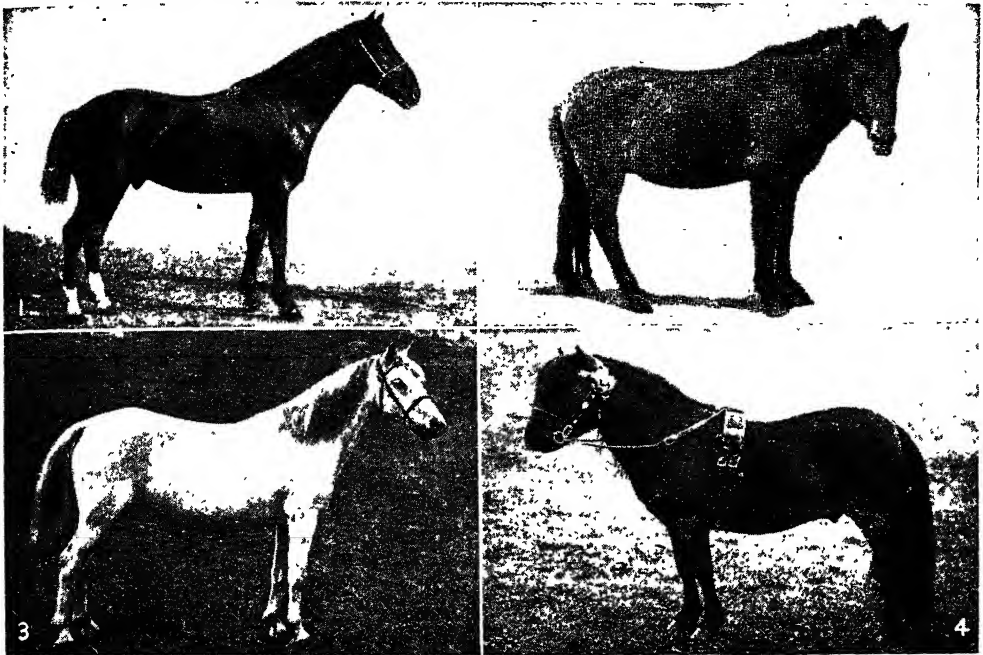
The ponies of Dartmoor and the New Forest have undergone considerable modification, and this also applies to the ponies of the Welsh hills. The various native strains have been greatly improved by the introduction of thoroughbred blood and by selection in breeding. The great aim of all breeders is to combine smallness and compactness with general usefulness. See illus. p. 6615; Horse, and colour plate; Polo.

Pony Express. Postal service operated in isolated districts of the U.S.A. It was introduced early in the 19th century to serve settle-

ments in the Far West, the letters being carried by riders using relays of small but hardy horses. Buffalo Bill was one of the chief pony express riders in California. The service still operates in some parts where neither rlys. nor motor roads are available.

Ponza (anc. *Pontiae*). Chief island of a small group, sometimes called the Pontine islands, in the Tyrrhenian Sea, belonging to Italy. It is 70 m. W. of Naples, and has a spacious harbour. The islands were used in Roman times as a place of banishment, and continued to be penal settlements in the 20th cent.

Pood or **PUD** (Norse, *pund*, pound). Russian measure of weight, equal to 40 Russian or 36 English lb. About 62 poods make a ton.



Pony. Some varieties of the animal. 1. New Forest pony, domesticated. 2. Mongolian, or Przewalsky's horse. 3. Welsh mountain pony. 4. Shetland stallion. See page 6614

Poodle. Breed of dog commonly supposed to be of French origin, but also found in Russia and Germany. In France and Russia the poodles are black, but in Germany a white breed is found.

The poodle is often considered to be the most intelligent of all dogs; it learns tricks very readily. Essentially a water dog, it makes one of the best retrievers known, and in Germany and France has been much employed in the chase. In its natural state the poodle has a very long coat, which often hangs in cords and drags the ground; but the popular fashion is to clip the hinder half of the body and the legs and tail, leaving the hair in tufts. See Dog colour plate.

Pooh-Bah. Character in the Gilbert and Sullivan comic opera, *The Mikado*. He is described as Lord High Everything Else, because he holds simultaneously every important salaried office in the town of Titipu, except that of Lord High Executioner. He is the embodiment of family pride, being able to trace his ancestry back to a "protoplasmic primordial atomic globule," but was open to cash bribery. His most quoted

phrase is: "Merely corroborative detail intended to give artistic verisimilitude to an otherwise bald and unconvincing narrative." His name has become synonymous with any holding of multiple and multifarious office.

Pool. Body of fresh water smaller than a lake (*q.v.*). The word is also used for the monetary stake contributed by the various players in card and other games, and indeed for any common fund. During the Second Great War, indus-

petrol was replaced by pooled petrol of a standard quality distributed by a single organization of refiners. Stores and multiple shops pooled their transport for the delivery of bulky objects. Butter and tea were sold as National butter and tea, trade brands being abolished. Rly. companies established pools of material at strategic points for the repair of lines damaged by enemy action. Fire-fighting services were thrown together under the N.F.S., while shipping pools were set up for the most efficient employment of vessels and crews. The fighting services maintained personnel pools to keep men available for dispatch to any ship or unit requiring immediate reinforcements. The ministry of Supply had a pool of scientists. See Football Pool.

Pool. Game played on a billiard table. It is played by any number of players from two to twelve, each having a different coloured ball dealt out to him by the marker, and playing in turn according to the sequence of the colours on the scoring-board. The object of the game throughout is to pocket the ball played on. The game begins by the white ball being placed upon the billiard spot, and the red ball is played by its owner, from the D, upon the white, the yellow on red, green on yellow, and so on, by their



Poodle. Champion corded poodle; upper picture, white miniature poodle

trial and commodity pools were established in Great Britain to economise in man-power, transport, and costs of distribution. Branded

respective owners. When a player pockets the ball which has come to him in proper rotation, he plays upon the ball nearest to the position where his own has stopped, continuing the process until he fails to score. Each person contributes an equal share to the pool, and starts with three lives, losing a life and paying forfeit each time his ball is pocketed by another player. A player who loses all three lives may under certain conditions "star," i.e. purchase another life or lives. The last player left in takes the pool. *See Billiards.*

Poole. Mun. borough, seaport, and largest town of Dorset, England. It stands on a peninsula, 5 m. W. of Bournemouth, and includes Branksome, Broadstone,



Pool of London. This part of the Thames seen from London Bridge

and $4\frac{1}{2}$ m. broad. It is known to yachtsmen, has a power station, and has been a base for flying boats. Here is Brownsea or Branksea I.

Pool of London. Name given to that part of the Thames between Limehouse Point and London Bridge, in which navigation is

of Ancient Usage drawn up by Edward I for the regulation of London's river-borne trade.

Pools. For this form of betting, see Football Pool; Sweepstake; Totalisator, etc.

Poona. Town of Bombay, India. The capital of a district, it stands at the union of the rivers Mutha and Mula, 120 m. S.E. of Bombay, and is an important rly. and road junction. It consists of a native town and a European quarter, and during British rule in India it had a residence for the governor of Bombay during the rainy season. It was also the



Poole, Dorset. Air view of the town and harbour
Aerofilms, Ltd.

Canford Cliffs, Hamworthy, Parkstone, Sandbanks, and Wallisdown. There is a rly. station. Old buildings are the town house, customs house, and guildhall. Municipal buildings were opened in 1932, and there are a public library and museum, school of art, nautical school, and churches of many denominations. Of 27 public open spaces the chief is Poole Park. Poole was a seaport in the Middle Ages and still has a coastal trade. Manufactures include a noted pottery, rope, bricks, tiles, chemicals, and agricultural implements. A borough from 1248, Poole was made a county of itself in 1569, having its own M.P. until 1885 and again from 1950. Pop. est. 80,000.



Poole arms

Poole Harbour is an inlet of the English Channel, about 7 m. long

strictly supervised. It is divided into the Upper and Lower Pools; the former extending from London Bridge to King's Head Stairs, Rotherhithe, the latter thence to Cuckold's Point, Limehouse. The term first appeared in the Articles



Poona, Bombay, India. The main street, and (upper picture), the Temple

headquarters of the Southern military command. An educational centre, here are the Deccan and Fergusson colleges. In 1928 a meteorological observatory was opened here to receive the Indian meteorological department, transferred from Simla.

The industries include the making of fine wares of gold, silver, brass, etc., and of cotton, paper, and flour. The buildings included temples and others erected by the Mahrattas, who made Poona one of the centres of their power, and more modern ones built by Europeans. The district of Poona has an area of 5,347 sq. m. Pop. dist., 1,359,408; town, 258,197.

Poon-wood (*Calophyllum inophyllum*). A tree of the family Guttiferae. A native of India and



Poon-wood. Flowers, leaves, and fruit

Malaya, it has large oblong leaves and sweet-scented flowers in loose sprays. The reddish fruit is the size of a walnut, and its seeds yield a thick, green oil, used medicinally. Poon-wood is used for building purposes, and for making masts and spars.

Poop (Fr. *poupe*, from Lat. *puppis*, hind part of a ship). Aftermost or highest part of a ship's hull, and, in sailing ships, the after spar deck abaft the mizzen. On the galleons of the 16th and 17th centuries, the poop was of towering proportions and was called the poop royal; it carried the mast supporting the lateen sail (*q.v.*), and at its end the taffrail to which one or more lanterns were fixed. Until the introduction of steam, the captain's living accommodation on warships was in the space below the poop deck. See Ship.

Poopo, LAKE OR. Situated 185 m. S.E. of Lake Titicaca in the dept. of Oruro, Bolivia. On old maps it is called Pampa Aullagas. It has an area of about 400 sq. m. and gives its name to the nearby town of Poopo.

Poor Clares OR CLARISSSES. Order of nuns founded in 1212 by S. Clare with the advice of

S. Francis of Assisi. They formed the Second Order of Franciscans. Having received no definite rule from S. Francis during his missionary journey in the E., they were brought under the Benedictine rule, which was repeatedly modified, and no uniform system was accepted, the Urbanists following the milder rule instituted in

1264 by Pope Urban IV, and the Coletines observing the reforms made by S. Colette in 1436. The Poor Clares devote themselves to the education of poor girls. They are under the authority of the Minorites, and the Minorities in London preserves the memory of one of their former nunneries. See Clare; Francis of Assisi. Consult S. Clare and Her Order, anon., 1912.

Poor Law. The first parliamentary attempt to provide for the poor of England was an Act of 1601, the original basis of the poor law. Its area was the parish, in each of which the churchwardens and some householders were made overseers, being charged with relieving the poor and raising the required money. Poor persons able to work were to do so, children were put out as apprentices, and relief was to be given to poor persons unable to work. The first workhouse was opened at Bristol in 1697.

In 1834 a union of parishes replaced the parish as the area; and boards of guardians took over the duties of the overseers, the necessary money still being raised by overseers by means of rates until in 1925 their functions were transferred to the rating authority. The poor law was consolidated by the Poor Law Act, 1927, and again by the Poor Law Act, 1930, made necessary by changes brought about by the Local Government Act, 1929. The Act of 1930 abolished boards of guardians and transferred their functions to county and county borough councils. Poor relief was then under



Poor Clares. Dress of the order of nuns founded in 1212

the general control of the minister of Health. In each area there was a public assistance committee with a local sub-committee called the guardians committee.

Poor relief might be either outdoor or in an institution. The functions of the council in relieving those between 16 and 65 were taken over by unemployment assistance boards. When the National Insurance Act, 1946, was passed, it was announced that the poor law would be abolished. An Act passed in 1948 provided for the setting up of a national assistance board under the minister of national insurance; its duty being to assist persons whose resources required to be supplemented, or who were totally without resources. Local authorities have to provide certain accommodation and services. The Act provided for (1) money grants and assistance in kind; (2) re-establishment centres for instruction and training; (3) reception centres to provide temporary board and lodging for vagrants; (4) residential accommodation for persons who by reason of age or infirmity were in need of care; (5) temporary accommodation for persons in urgent need; (6) welfare services for blind, deaf, dumb, or disabled persons. The accommodation and services under the last three headings have to be provided by county and county borough councils.

Poor Man's Lawyer. Voluntary organization for giving free legal advice to poor persons. The first was set up at Mansfield House settlement in Canning Town in 1890. See Poor Persons' Procedure.

Poor Persons' Procedure. Procedure in the high court for enabling persons of small means to obtain assistance of barristers and solicitors in litigation free of charge. From 1700 or earlier a system of legal aid has existed in England under which persons who could show that they were not worth more than £5 (later £25) could bring or defend legal proceedings, free of legal charges or court fees, in the house of lords, court of appeal, high court, etc. For the two last a more regular system was introduced in 1914, and extended in 1919, to extend the aid to those with incomes below £2 a week (in special circumstances £4). During the Second Great War it was again extended to include, in matrimonial cases, any person in the services up to the rank of sergeant. From 1926 the Law Society administered the system through

poor persons' committees, assisted from 1942 by the services divorce department. Outside the official scheme, good work was done by various poor man's lawyer societies, by the Bentham committee, by trade unions and approved societies, and by charitable associations.

The Legal Aid and Advice Act, 1949, provided for free legal aid or assistance in civil proceedings in England and Wales for persons with incomes not exceeding £420 a year and with disposable capital of not over £500. Administration of the scheme was placed in the hands of the Law Society. These measures were in implementation of the Rushcliffe report of 1945, and were put into operation in 1950. A similar act was passed for Scotland. For procedure in criminal courts see Poor Prisoners' Defence Acts.

Poor Prisoners' Defence Acts. Acts of parliament, 1903 and 1930, governing the provision of legal aid for accused persons in criminal cases. An accused person on trial at quarter sessions, the assizes, or the Old Bailey, has long been entitled to choose from the dock any barrister present in court to defend him, and the barrister is bound to accept the "dock brief" unless he has special grounds for refusing, e.g. is engaged to prosecute. But there was never adequate opportunity of preparing a defence until the passing of the 1903 Act. This enabled the magistrates, after committing the accused for trial, or the judge at the trial, to grant a certificate entitling the accused to be represented by a solicitor and barrister paid out of public funds. But the certificate was granted only if the magistrates or judge were satisfied that it was desirable "having regard to the evidence given or statements made" by the accused, who, therefore, was under the disadvantage of having to disclose to those about to try him what his defence was going to be. Nor was any legal aid provided for the accused at the magistrates' court. The 1930 Act gave an accused person the right to free legal aid at the magistrates' court, the cost falling on the rates. It also enabled a certificate to be granted where the accused had insufficient means to pay for legal aid and where the magistrates considered that "by reason of the gravity of the charge or of exceptional circumstances," it was desirable, in the interests of justice, that he should be legally represented. This certificate entitled him to the services of a solicitor and, in murder cases, a barrister

also. If a magistrate failed to grant a certificate, the judge might do so. A certificate was bound to be supplied in a case of murder. Other clauses enabled an accused person of small means to be granted legal aid on an appeal to quarter sessions, or to the court of criminal appeal, or to the house of lords.

The Rushcliffe committee of 1944-45 recommended that any doubt in the minds of magistrates or judge as to the granting of a certificate should be resolved in favour of the accused.

Poor Richard's Almanac. Almanac compiled by Benjamin Franklin. He began it in 1733 under the pseudonym Richard Saunders and continued to issue it annually for 25 years from his printing office in Philadelphia. Besides containing astronomical and tide tables, each issue was distinguished by pithy and proverbial sayings, e.g. "Early to bed, and early to rise, makes a man healthy, wealthy, and wise."; "For want of a nail the shoe was lost; for want of a shoe the horse was lost; for want of a horse the rider was lost; being overtaken and slain by the enemy, all for want of care about a horse-shoe nail." Until publication ceased in 1758, this was for many Americans the only book regularly bought and read. See Almanac.

Poor's Roll. In Scots law, a register of persons who, on the ground of poverty, have obtained leave of the court to bring or defend actions *in forma pauperis*. They are exempt from payment of court fees, and if the court is satisfied that they have reasonable ground of action, it appoints agents and counsel who represent them gratuitously.

Popayán. City of Colombia, capital of the dept. of Cauca. It stands near the river Cauca, at the foot of the Purao volcano, at 5,800 ft. alt. It has a cathedral, bishop's palace, government buildings, and a university, and is celebrated for the beauty of its classic Spanish architecture. A commercial highway runs S. from the city by Quito to Trujillo in Peru. Popayán is connected with Buenaventura by the Pacific rly. and with Bogotá by the Girardot-Tolima and Pacific rlys. The manufacture of blankets is the chief industry. Founded in 1537, Popayán was a gold mining centre in the 18th century, was nearly wrecked by an earthquake in 1834, and suffered severely in the civil wars. Pop. 30,038.

Popcorn. Variety of maize or Indian corn. Its large oil content causes the grain to expand and pop or explode when roasted. In this condition it is favoured as a breakfast cereal in the U.S.A. Popped corn coated with sugar is a popular sweetmeat.

Pope. THE (Gr. *pappas* or *papas*, Lat. *papa*, father). Name specifically applied to the bishop of Rome since 1073. The full title of the pope is bishop of Rome and vicar of Jesus Christ, successor of S. Peter, prince of the apostles, supreme pontiff of the Universal Church, patriarch of the West, primate of Italy, archbishop and metropolitan of the Roman province, and sovereign of the temporal dominions of the Holy Roman Church.

Known also as Pontifex Maximus, he claims supreme authority in all matters of faith. Elected by the college of Cardinals, who must agree by a majority of two-thirds plus one, he is crowned in S. Peter's

THE POPES OF ROME FROM URBAN VI TO PIUS XII

Urban VI, April, 1378–Oct., 1389	Clement VIII, Jan. 1592–March, 1605
Boniface IX, Nov., 1389–Oct., 1404	Leo XI, April, 1605
Innocent VII, Oct., 1404–Nov., 1406	Paul V, May, 1605–Jan., 1621
Gregory XII, Nov., 1406–July, 1415	Gregory XV, Feb., 1621–July, 1623
Alexander V, June, 1409–May, 1410	Urban VIII, Aug., 1623–July, 1644
John XXIII, May, 1410–May, 1415	Innocent X, Sept., 1644–Jan., 1655
Martin V, Nov., 1417–Feb., 1431	Alexander VII, April, 1655–May, 1667
Eugenius IV, March, 1431–Feb., 1447	Clement IX, June, 1667–Dec., 1669
Nicholas V, March, 1447–March, 1455	Clement X, April, 1670–July, 1676
Callixtus III, April, 1455–Aug., 1458	Innocent XI, Sept., 1676–Aug., 1689
Pius II, Aug., 1458–Aug., 1464	Alexander VIII, Oct., 1689–Feb., 1691
Paul II, Aug., 1464–July, 1471	Innocent XII, July, 1691–Sept., 1700
Sixtus IV, Aug., 1471–Aug., 1484	Clement XI, Nov., 1700–March, 1721
Innocent VIII, Aug., 1484–July, 1492	Innocent XIII, May, 1721–March, 1724
Alexander VI, Aug., 1492–Aug., 1503	Benedict XIII, May, 1724–Feb., 1730
Pius III, Sept., Oct., 1503	Clement XII, July, 1730–May, 1758
Julius II, Nov., 1503–Feb., 1513	Benedict XIV, Aug., 1740–May, 1758
Leo X, March, 1513–Dec., 1521	Clement XIII, July, 1758–Feb., 1769
Adrian VI, Jan., 1522–Sept., 1523	Clement XIV, May, 1769–Sept., 1774
Clement VII, Nov., 1523–Sept., 1534	Pius VI, Feb., 1775–Aug., 1799
Paul III, Oct., 1534–Nov., 1549	Pius VII, March, 1800–Aug., 1823
Julius III, Feb., 1550–March, 1555	Leo XII, Sept., 1823–Feb., 1829
Marcellus II, April, 1555	Pius VIII, March, 1829–Nov., 1830
Paul IV, May, 1555–April, 1559	Gregory XVI, Feb., 1831–June, 1846
Pius V, Dec., 1559–Dec., 1565	Pius IX, June, 1846–Feb., 1878
Pius V, Jan., 1566–May, 1572	Leo XIII, Feb., 1878–July, 1903
Gregory XIII, May, 1572–April, 1585	Pius X, Aug., 1903–Aug., 1914
Sixtus V, April, 1585–Aug., 1590	Benedict XV, Sept., 1914–Jan., 1922
Urban VII, Sept., 1590	Pius XI, Feb., 1922–Feb., 1959
Gregory XV, Dec., 1590–Oct., 1591	Pius XII, March, 1939–
Innocent IX, Oct., Dec., 1591	

by the dean of the Sacred College. His ordinary dress includes a white silk cassock and rochet and a scarlet mantle; his insignia, the straight crosier, or *pedum rectum*, pall or *pallium*, and tiara or triple crown. He is addressed as Your Holiness, *Beatissime Pater*, etc., and refers to himself as *Servus Servorum Dei*, servant of the servants of God.

The more important are referred to separately under their official names. The term Black Pope is sometimes humorously applied to the general of the Society of Jesus, in allusion to his black cassock. See Anti-Pope; Infallibility; Papa; Papacy; Rome.

Pope, ALEXANDER (1688-1744). English poet and satirist. He was born May 21, 1688, in Lombard

of a translation of The Thebaid of Statius and the Pastorals.

By the time he was 24 he had come to be regarded as the leading poet of his time. His reputation was made first by his Essay on Criticism, 1711, a didactic poem on the canons of literary taste and style, and secondly by The Rape of the Lock (*q.v.*), 1712, a brilliant satire on the fashionable life of his time. The poem brought great fame, with a circle of literary friends, which included Gay, Addison, and Swift. Pope became a member of the Scriblerus literary club, formed under the presidency of Swift.

The task of translating Homer into rhyming pentameters now became the main occupation of Pope's life, the first part of the Iliad appearing in 1715, the last part of the Odyssey in 1725. The translations were most favourably received, but the real spirit of Homer is lacking. Pope received some £10,000 for the work, and the money thus earned enabled him in 1718 to establish himself comfortably with his mother in a villa on the banks of the Thames at Twickenham, where he lived until the end of his life, May 30, 1744. At the Twickenham villa Pope's chief diversions were landscape gardening, and the visits of friends.

During the period in which he was occupied with Homer he published two powerful poems, Elegy to the Memory of an Unfortunate Lady, and Epistle of Eloisa to Abelard; he was also engaged on an edition of Shakespeare. This last work came in for unfavourable criticism from Lewis Theobald, an indifferent man of letters, but possessed of a sounder knowledge of Shakespeare than Pope. This so annoyed Pope that he made Theobald the hero of his great satirical poem, The Dunciad, 1728. The scheme of The Dunciad, namely the castigation of all literary pretenders of the day, had long been in Pope's mind. A fourth book was added 14 years later, Colley Cibber being substituted for Theobald as the hero. About 100 contemporary writers are impaled in The Dunciad, but some like Bentley were men of real eminence.

The concluding period of Pope's life was occupied with philosophical and critical poems, of which the most notable is his Essay on Man, 1733. This exposition of the philosophy of Bolingbroke contains passages of great eloquence that are perhaps more quoted than anything outside Shakespeare. The influence of Bolingbroke, with whom

he had become friendly, is also to be traced in Imitations of Horace and Moral Essays.

It cannot be gainsaid that Pope was of an irascible disposition. He quarrelled with Addison when the latter pronounced Tickell the best translator of Homer; also with Lady Mary Wortley Montagu, who called him "the wicked wasp of Twickenham." Much may be forgiven him, however, on account of his health, and to the credit side must be placed his uninterrupted friendship with Swift and others. His position as a poet has been the subject of much controversy. His technique is beyond praise; he handled the heroic couplet inherited from Dryden as no other poet has done; but he lacks warmth of emotion, shows no real feeling for nature, and his finest passages are often rhetorical rather than spiritual. He excelled in condensing into an epigram "what oft was felt, but ne'er so well expressed." He is one of the first in delighting the intellect: one of the last to stir the soul.

Bibliography. Works and Correspondence, ed. W. Elwin and W. J. Courthope, 10 vols., 1871-89; Lives, O. Ruffhead, 1769; L. Stephen, 1888; E. M. Symonds, 1909; E. Sitwell, 1932; The Age of Pope, J. Dennis, 1894; Mr. P., His Life and Times, G. Paston, 1909; Early Career of Pope, G. Sherburn, 1934.

Pope, JOHN (1822-92). American soldier. Born March 16, 1822, at Louisville, Ky., he was educated at West Point. He served with distinction in the Mexican War, and was also engaged at different times on surveying and engineering work. After the outbreak of the Civil War he was appointed brigadier-general in 1861, and was mostly successful, until defeated by Lee and Jackson at the second battle of Bull Run, 1862. Pope blamed McClellan and Fitz-John Porter for his defeat, but at his own request was relieved of his command, and was transferred to the North-West department where his task was to keep the Indians in subjection. He retired in 1886 and died Sept. 23, 1892.

Pope Joan. Card game. It is played with a full pack, by any number of persons from three to twelve. A small round board, divided into special compartments, is also required. The eight of diamonds is removed from the pack. The dealer having been determined he dresses the board (providing the stakes himself or each player contributing a share) by placing counters upon the different divi-



After H. Hudson

A. Pope

Street, London, where his father was a prosperous linen draper. Bred in the R.C. faith, Pope was denied the privileges of education at a first-class school, but his bent was studious, and he more than made up for imperfect schooling by reading at home. Religion also made it impossible for him to enter any of the professions, while a business life was out of the question for one who was not only weak in health, but actually deformed. His own predilection was for literature, and the fact that his father was financially independent, having retired to a small estate on the borders of Windsor Forest, made it possible for the lad to follow his own inclinations. It is said that a brief interview with Dryden at the age of 12 determined his career. He displayed remarkable precocity in verse writing, many thousands of lines having been written before he was 16. All these he is said to have destroyed with the exception

sions—one each to ace, king, queen, knave, and game; two to Matrimony, two to Intrigue, six to the nine of diamonds, known as Pope.

The cards are then dealt round, with an extra hand left in the middle of the table which forms stops; the last card being turned for trumps. Also the four kings and the seven of diamonds are always stops. If either ace, king, queen, or knave is turned up for trumps, the dealer is entitled to whatever stake is contained in either of those compartments upon the board; if Pope is the card turned, the dealer appropriates all these and game, including a stake from each player for every card he has had dealt him.

Otherwise, the game begins by the player on the left of the dealer leading any card he chooses, generally his lowest card of any suit, at the same time naming it, and playing out a sequence, each player following on until a stop occurs, the player of the card forming the stop having the next lead. This continues until some player has succeeded in getting rid of all his cards.

The first person to accomplish this is entitled to all the stakes in the compartment marked game, and also receives from the other players a counter or stake for each card left in their hands; only the holder of Pope, if this card has not been previously played, being exempt from payment. Whenever the ace, king, queen, or knave of the trump suit is played during a hand, the holder appropriates the counters contained in the corresponding compartments on the board. Knave and queen of trumps in one hand give the player of these cards a right to all counters in the Intrigue division; and he who plays queen and king takes all counters in the division marked Matrimony. The player of Pope profits similarly. See Joan.

Poperinghe. Town of Belgium, in the prov. of W. Flanders. It stands on the Vleirbeck, a tributary of the Yser, 6 m. W. of Ypres. The town is a hop growing centre and trades also in locally grown tobacco. Brewing, tanning, pottery, lace and woollens are industries. The Romanesque church of S. Jean, 13th cent. and the 15th cent. church of S. Bertin, with a conspicuous square tower surmounted by a cupola, are noteworthy.

During the First Great War Poperinghe was a centre of the British forces on the Flanders front; town and neighbourhood contained numerous camps, supply services, casualty clearing stations,

etc. Held by German troops at the beginning of the war, it was occupied by Allied forces on Oct. 15, 1914. It suffered sporadic bombardment, but no serious damage until the German advance in April, 1918, brought it within closer range. "Toc H" or Talbot House (q.v.) was established here in 1915. Pop. 11,500.

Popeye. Film cartoon character. Popeye the Sailor, famous for raucous voice and sardonic sayings, was devised by Dave Fleischer (q.v.) and first appeared in a series of one-reel American films exhibited during 1933-34. The Popeye cartoons were perhaps second only in popularity to those of Walt Disney.



Popeye. The famous film cartoon character

Popham, Sir Home Riggs (1762-1820). British sailor. Born at Tetuan, Oct. 12, 1762, the 21st child of his parents, he entered the navy in 1778, but soon transferred temporarily to the merchant service and did useful hydrographic work in the East Indies. He was attached to the army in Flanders, returned to organize a system of sea-fencibles or coast guard volunteers, and in 1799 went to Kronstadt in charge of the convoy of Russian troops to Hol-



Sir Home Popham, British sailor

land. Popham introduced a new system of signalling at sea, and this was used at Trafalgar. He commanded the fleet conveying the army which retook Cape Town in 1806, but was court-martialled and reprimanded for undertaking against Brazil an expedition which miscarried. After much sea service, he was appointed in 1817 commander-in-chief on the Jamaica

station. A knight from 1815, he died Sept. 10, 1820.

Popinjay. Old English word for parrot. It is still used in heraldic language to describe a parrot as a bearing or charge. The name was given to a dummy bird used as a target in early times.

Popish Plot, THE. Name given to an imaginary R.C. conspiracy in 1678. Taking advantage of popular feeling against the duke of York and all Roman Catholics, Titus Oates (q.v.) swore an information, Sept. 6, 1678, before Sir Edmund Berry Godfrey (q.v.) to the effect that a Popish plot was afoot to kill the king and carry out a general massacre of Protestants. Five weeks later Godfrey was found murdered; popular panic ensued.

Oates then for two years earned the £900 pension which had been granted him, by a series of astounding revelations compromising Catholics in all stations of life, many of whom were imprisoned or executed on the mere word of Oates or his accomplices. The commons tried to exclude the duke of York from the succession, but by its very enormity the execution of Lord Strafford in 1680 induced a saner atmosphere, and on the dissolution of parliament, 1681, Charles II was able to allay the public frenzy. One of Oates's informers, Colledge, was found guilty of perjury, and in 1685 Oates was himself convicted. See Dangerfield; Toleration.

Poplar (*Populus*). Genus of trees of the family Salicaceae. They are natives of Europe, Asia, and N. America. They have alternate leaves, and the small flowers (without sepals or petals) are crowded in hanging catkins, which usually appear before the leaves. The sexes are on different trees. The



Poplar. 1. The white poplar. 2. Leaves of the black poplar. 3. Male catkins and fruit

females are succeeded by dry fruits containing numerous seeds, each of which has a tuft of cottony hairs at its base. The trees are of rapid growth, and require much light. The timber is not valuable. Familiar examples are white poplar (*P. alba*), black poplar (*P. nigra*), and the aspen (*P. tremula*). See also Lombardy Poplar.

Poplar. Met. bor. of the co. of London. It lies N. of the Thames, opposite Greenwich, combines the parishes of Poplar, Bow, and Bromley, and contains the East and West India docks, Millwall docks, and the Isle of Dogs. It has an area of 2,728 acres and a pop. (1947) of 73,000, and is served by London Transport and by trains from Broad Street and Fenchurch Street. The church of S. Matthias, 1776, much restored, was once the chapel of the East India Co.; that of All Saints dates from 1823. Public buildings include the modern town hall (1937), libraries, and baths. Among other prominent buildings are the L.C.C. school of engineering and navigation, Poplar hospital, and S. Andrew's hospital, Bow.

In addition to Victoria Park, which covers an area of 73½ acres, the bor. has several small open spaces, including Island Gardens, 3 acres, with a river front of 700 ft., opened in 1895 largely through the instrumentality of Will Crooks, M.P. In Island Gardens is the entrance to the tunnel to Greenwich, opened in 1902. An institute was erected as a memorial to men who fell in the First Great War.

The bor. has a large pop. of dock workers. For refusing to levy rates to meet the precepts of the L.C.C. and the Metropolitan Asylums Board, certain members of the borough council, including George Lansbury (q.v.), were imprisoned in 1921. As an industrial area, Poplar was subjected to heavy and continuous air attack during the Second Great War, and severe damage was done. Schemes for rebuilding were put in hand during 1945-46. Poplar, until 1817, was just a hamlet of the village of Stepney.

Up to 1950 the bor. elected two M.P.s, being divided into two divisions, Bow and Bromley, and South Poplar; in 1950 it was made one bor. constituency.

Poplin. Term originally applied to a ribbed fabric with a silk warp and worsted weft, made mainly in France and used for dress material and upholstery. Nowadays the term usually means a fine-ribbed cotton fabric, widely used for

shirtings, blouses, tropical suits, etc. They may be plain, or have woven or printed stripes.

Popocatepetl (Aztec, smoking mountain). Conical volcano of Mexico. Situated about 40 m. S.E. of Mexico City, it is an active volcano reaching 17,520 ft. There were big eruptions in 1802 and 1921. The crater, 2,700 ft. across, produces a large quantity of pure sulphur. The peak was first scaled by Diego Ordez in 1522.

Popolo d'Italia, Il. Daily newspaper of Milan, founded and edited in 1914

by Benito Mussolini, when he left the editorship of the official socialist Italian newspaper *Avanti!* and was expelled from the Socialist party for having sponsored Italian intervention in the First Great War. It carried at the beginning the sub-title *Socialist Daily*, which disappeared when Mussolini founded the Fascist movement. When Mussolini became prime minister in 1922 the editorship of *Popolo d'Italia* passed to his brother Arnaldo, and, at the latter's death, to Arnaldo's son. The paper ceased to appear when the Fascist regime collapsed in 1943.

Poppaea Sabina. Mistress and eventually the wife of the Roman emperor Nero. She was a woman of infamous character, according to Tacitus possessing "everything save honour." Nero divorced Octavia to marry her.

Poppy (*Papaver*). Genus of about 110 erect annual or perennial herbs of the family *Papaveraceae*. They are natives of Europe, Asia, Africa, and Australia. The five British species have become partially naturalised in the

U.S.A. They have erect stems with variously lobed or cut alternate leaves, and large, showy flowers on long stalks. The two concave sepals are thrown off usually by the expansion of the four petals.



Popocatepetl. The great Mexican cone-shaped volcano in an active state

The stamens are very numerous, surrounding the conspicuous ovary whose four to 20 stigmas are united into a disk, which later forms a roof with eaves to the large seed-capsule. The numerous small oily seeds can escape from openings under the eaves of the ripe capsule only when the latter is jerked.

The larger opium p. (*P. somniferum*) of Europe, Asia, W. Africa, with white or purple flowers, has become naturalised in parts of Kent and Surrey. This and the Oriental p. (*P. orientale*) are frequently grown in gardens, where, however, the Shirley p. is the more general favourite. All poppies are easily grown from spring-sown seed in any garden soil. All the species have a milky sap with narcotic properties, and the seeds under pressure yield a valuable oil which is not narcotic. See Fruit illus.; Opium.

Poppy Day. Name sometimes given to Armistice Day (q.v.) because artificial poppies, commemorating the poppies that bloomed in no-man's-land in Flanders during the First Great War, were sold on that day to help ex-service men.



Poppy. Three well-known varieties. Left, the Oriental; centre, the scarlet field poppy (*Papaver rhoeas*); right, Shirley poppies, favourite garden species

Popular Front. Term used for a left-wing coalition in politics. The idea is said to have been originated by the Bulgarian politician Georgi Dimitrov (q.v.), and first came into prominence during 1935-36, especially in France and Spain. The popular front included mainly Socialists and Communists, and also other left-wing groups, such as Radicals in France and Liberals and Anarchists in Spain. Especially in France this cooperation had some initial success, en-

forcing the 40-hour week and a modicum of state control of industry; but the flight of capital followed, and many industries were disorganized by large-scale strikes, among them the then new form of "sit-down" strike. Daladier in France and Azana in Spain failed to make a genuine success. In France the Nazi menace proved too strong a diversion from merely domestic politics, and in Spain the civil war of 1936-39 ended popular front government.

of England and Wales was in 1940 "projected" to 1970, under the auspices of the League of Nations, by the bureau of population research of Princeton university, U.S.A. (see Table 1).

By 1940 the youngest age-group had been declining for some time; the age-group of enterprise and reproduction had already passed its zenith; and the groups of maturity and old age were growing rapidly. The projection for 1970 is based on pre-1939 tendencies, and it is uncertain whether any lasting change in child-bearing habits is likely following the Second Great War; but no action or event — short of pestilence, mass-bombing, or mass-migration — can materially affect the numbers of the population in England and Wales which will be adult in 1970. The potential mothers of England and Wales are not reproducing themselves and the indications are that the population will consolidate itself in the higher age-groups and, after 1970, decline rapidly. This applies also to Scotland, Northern Ireland, and Eire, though none of these would, it was estimated, reach the peak of its population by 1945; in Eire the projection anticipated no decline before 1970.

The question arises whether, in view of the difficulty experienced in Great Britain during and after

POPULATION: FACTS & PROBABILITIES

T. J. Hickey, Editor, *The Statist*, and G. A. Gordon, F.S.S.

This explanation of the effect of the changing numbers and age-composition of world populations is amplified by articles on Birth Rate and Death Rate. See also plate facing p. 6609.

The population (Lat. *populatio*) of any territory rises or falls with the natural increase or decrease (excess or otherwise of births over deaths) and the balance of migration (excess or otherwise of immigrants over emigrants).

It can be argued that a territory should not have a larger population than it can feed and maintain from its own resources. This was the theory advocated in Great Britain by Malthus (q.v.) at the beginning of the 19th century. The population of England and Wales, however, rose from 9 million in 1801 to 22.7 million in 1871, and it was found that the extra labour which thus became available more than sufficed, thanks to the working of the industrial revolution, to maintain the nation's internal well-being and external expansion. The home population exceeded 30 million by the end of the century despite a large excess of emigration over immigration, this phase of high fertility coinciding in fact with the great period of British imperial development.

British fertility began to decline in the 1870s. The population still included, however, a large proportion of women of child-bearing age, so that the number of births continued to increase till about the end of the century. At the same time, and this extended into the 20th century, there was an important decline both in infant mortality and in general mortality rates, so that births still exceeded deaths and the population continued to grow until at the end of the Second Great War it was about 43 million. Throughout this period there was a natural increase which offset an outward migration balance until about 1930, after which immigration exceeded emigration, chiefly as a result of the unsettled

conditions in Europe during 1930-39, and of the restrictions imposed upon immigration into the U.S.A. and the British dominions as an effect of the world depression of 1929 onwards.

Reduced mortality was very important, both statistically and in social development. In the 18th century, it was still common enough for a woman to have "borne twelve and buried ten"; and the large families of the mid-Victorian age resulted from increased survivors of the perils of infancy. Smaller families were induced, in part, by the economic depression of the 1880s, which lasted into the 1890s. They became general thereafter because the scope for emigration was diminishing and because, with better health conditions increasing the number

of older men in the home labour market, young men had smaller prospects of prosperity, and therefore tended to postpone marriage, while young married couples felt less sure of their economic future.

In the result, the British population grew older as it grew larger, and the natural turning-point is the time when the reduced number of potential mothers (women aged 15-45), with the child-bearing habits of the time, fail to produce babies enough to replace the number of persons dying. This event, it was anticipated, would happen about 1945, but was postponed at any rate beyond that year by an increase in births during and just after the Second Great War. On the basis of tendencies noted during 1919-39, the probable population

Population, Table 1. Pop. of England and Wales by Age Groups (in thousands), with 1970 Projection

AGE	1881	1911	1940	1970
0-14	9,458	11,051	8,610	4,880
15-44	11,600	17,315	19,250	14,910
45-64	3,708	5,826	9,330	11,450
65+	1,209	1,878	3,680	5,840
TOTAL	25,975	36,070	40,870	37,080

the Second Great War in feeding a large population, some decrease in the total may not be desirable. In fact, the growth of population in the 19th and early 20th centuries was associated with improved living standards only because of the growing industrial productivity of the growing labour force in the first country to become highly industrialised. Great Britain, in this period, produced a diminishing proportion of her own food; but she produced manufactured goods for which there was a demand overseas, whence the food required at home could be imported. As increasing industrialisation in countries which formerly devoted themselves primarily to the production of food and raw materials reduces the

relative demand for British manufactured goods, it is arguable that Great Britain could live better with a smaller population which would require less imported food. If the same standards of living were to be maintained, however, decrease in population would have to be accompanied by an increase, or at least by the absence of any decline, in the industrial productivity, and a positive increase in the home food productivity, per head of population. With a growing proportion of the people in the pensioner age-group, and therefore unproductive or at best much less productive, it would require an important rise in the output per worker to maintain the output per unit of population. However much a man may save to provide for his declining years, or whatever pension he may collect from the state, the food he eats after his retirement is produced or bought by the current labour of his juniors. With a growth in the proportion of unproductive consumers, there must be either a decline in living standards or a growth in the output of the workers who are still productive. That is to say, if the old age pensioners of the 1970s are to be supported in comfort, more babies than the actual reproduction trends make likely must be born in the 1950s, or those who are born must work very much harder than those born in, say, 1900.

The tendencies observed in Great Britain are at work, though at different stages, in many other countries. Broadly speaking, the industrial and developed peoples of W. Europe and N. America had by 1945, on known fertility trends, either passed or come within sight of the zenith of their population growth. On the other hand the populations of Russia, eastern and southern Europe, and S. America were entering on the phase in which birth rates were still high and mortality rates were beginning to decline. Spain, it is estimated, will not reach its zenith before 1965; Portugal and the Balkan states can hardly reach the peak before 1970; and the Russian population is likely to continue increasing till considerably later.

The effect of these movements, so far as Europe is concerned, is shown in Table 2, also taken from the projections already quoted. The figures are, of course, simply estimates based on pre-1940 tendencies; and what, if any, enduring effects the Second Great War may have had on demographic

tendencies cannot be apparent until the 1950s or later. It remains probable that the basic tendencies supported by the table are close to the truth.

The increase in population projected for Russia and the E. of Europe will, of course, arise from longer life in these regions as well as from a higher birth rate than is now normal in W. Europe. The size of the population under 20 years of age is expected to reach its peak by about 1955; the older age-groups will, at that time, still be increasing rapidly, but the proportion of youth to age will still be impressive. In 1970, according to this projection, there will be 112 males under 20 years of age, as compared with about 200 in 1945, for every hundred who are over 40 years old. The number of males under 20 for every 100 over 40 both in the British Isles and in France in 1945 was about 82; by 1970 it is likely to be about 46½ for France and 40 for the British Isles.

"Demographic Balance"

Apart altogether from the potential problems which arise through the population of some territories increasing while that of others is decreasing, the basic problem is that of demographic balance. High birth rates originated in times of high infant mortality and high general mortality; and medical science has lowered and is lowering both classes of mortality. In N.W. Europe and in N. America, economic and social conditions produced a rough corrective in the form of lower fertility. In E. Europe and S. America, areas with high mortality, if through increasing spread of medical knowledge the death rate is reduced, growth of population may be very rapid.

If population could be made a matter of policy, each nation would aim at stabilising its own population at the optimum size and the optimum age structure economically; and the subject would also be made a matter of international policy. It has, however, proved impossible for an individual nation to pursue a population policy even when it has defined one; and the world is some way from being able to consider the matter internationally. Consult Population of Britain, E. M. Hubbard, 1947.

Populist. Name of a political party in the U.S.A., 1891-1900. Chiefly drawn from agricultural and industrial groups, it nominated

Population. Table 2. European and U.S.S.R. Population Projection. 1940-70 (Princeton Bureau estimates; in millions)

	1940	1950	1960	1970
U.K. & Eire	50.2	50.6	49.4	46.8
W.-Central Europe	163.0	166.0	165.0	159.0
N. Europe	20.1	20.5	20.3	19.5
S. Europe	77.5	82.3	85.5	86.5
E. Europe	87.7	95.2	101.0	105.0
U.S.S.R.	174.0	203.0	228.0	251.0
TOTAL	572.5	617.6	649.2	667.8

a presidential candidate in 1896 and 1900.

Porbandar. Indian state and town in Kathiawar peninsula. Formerly in the Western India states agency, the state is now part of the Saurashtra union. It lies along the Arabian Sea in the S.W. of the peninsula. The town, which was Gandhi's birthplace, has a harbour and a rly. terminus. Only small vessels can use the port. The state covered 642 sq. m. and had a pop. of 146,648. Pop. of town, 23,699.

Porcelain. Fine pottery distinguished from earthenware by being a vitreous translucent substance coated with a hard transparent glaze. It was discovered by the Chinese, wherefore it is often called china, and attained great perfection during the Ming dynasty, 1368-1644. The Japanese also have made porcelain for many centuries. It was not introduced to Europe until the late 17th and 18th centuries, France preceding Germany, and England following quickly. In each country it has been a new invention dependent upon the discovery of the correct material at hand. See Chinaware; Pottery.

Porcelain Tower. Pagoda which formerly stood on West Hill, Peking, China. Built early in the 15th century, it was entirely of coloured porcelain, octagonal in shape, 261 ft. high, and had eight storeys. It was destroyed in 1853.

Porch (Lat. *porticus*). In building, an enclosed space of entrance and exit projecting from the main mass, sometimes as the lower part of a pavilion the whole height of the structure. The church porch originated in the narthex (*q.v.*). The Gothic porch of parish churches was frequently constructed of timber. In civil and domestic architecture, the term includes the gabled cottage porch, and the verandah screening the entrance to a house in the "colonial" style,



Porch. Examples of the porch in principal styles of architecture. 1. Culver Homestead, New York, U.S.A., Colonial style. 2. Parish church, Clay-next-the-Sea, Norfolk, Late Perpendicular Gothic. 3. Old School House, Woolley, Herefordshire, English half-timber. 4. Church of S. Mary-le-Strand, London, Classic designed by Gibbs. 5. Woolwich Town Hall, modern Classic. 6. Cranbourne Manor House, Dorset, English Renaissance

and has also come to be loosely used for the outer lobby of a house, between outer and inner entrances. See Basilica.

Porch, THZ. Name given to the Stoics and their philosophy. The school was founded about 310 B.C. by Zeno of Citium, in Cyprus, who lectured in the market place at Athens in the Stoa Poikilē, the painted porch (or, rather, colonnade), adorned with paintings by Polygnotus. See Stoicism.

Portchester OR PORTCHESTER. Village of Hampshire, England. It stands on Portsmouth Harbour, 7 m. by rly. N. by W. of Portsmouth. Its interest is mainly historical. An important Roman station, and later a prosperous seaport, it was one of the chief stations of the navy until the receding of the sea made it useless as a port. Of the Norman castle built in the 12th century, there are remains, including the keep. In 1926 these became the property

of the nation. S. Mary's church, also of the 12th century, has been largely restored. Pop. 2,267.

Porcupine (Fr. *porc*, pig; *épine*, prickle). Rodent mammal of the family Hystriidae, distinguished by the possession of a defensive armour of hollow quills and spines. Porcupines are distributed over large areas of S. Europe, S. Asia, Africa, and America. The common porcupine (*Hystrix cristata*) found in both Europe and Africa, is a bulky animal about 27 inches in length, and has black hair with a white crest on the head and band of the neck. The quills are ringed with black and white, and are of great length. The shorter open quills on the tail seem to serve the purpose of rattles to warn any animal that proposes to molest the porcupine. These animals generally occur in hilly districts, and spend the day in burrows or in clefts in the rocks, feeding at

night upon roots and vegetables, and often greatly damage gardens. If attacked, they rush backwards at their foe, and can inflict severe wounds with their quills.

The porcupines of America are different in appearance, having short quills and long tails, which in the tree porcupines of S. America are prehensile. As the quills are barbed at the tips and are loosely attached to the skin, they make serious wounds by working their way into the flesh of the animal attacked, and are difficult to extract. The Canadian species (*Erethizon dorsatus*) makes effective use of its thickly quilled tail as a weapon. These porcupines climb well and spend much of their time in the trees, where they strip off the foliage and eat the bark. They make their home in hollow trees and in rock crevices.

Porcupine Grass (*Triodia*). Small genus of grasses of the tribe Festuceae, three species natives of

Australia, and one native of tropical Asia. The leaves are in the form of spines, which inflict severe wounds on man or beast venturing among the grass.

Pordenone, IL (1483-1539). Italian painter. Born near Pordenone, Venetia, whence the name by which he is generally known, Giovanni Antonio de Sacci, or Licinio, developed under the influence of Bellini, Giorgione, and Titian. In the cathedral of Cremona he painted colossal dramatic frescoes of the Passion, 1521-22, and an altarpiece representing the Virgin between Saints. For the cathedral of Pordenone he executed a Madonna of Misericordia, 1515; S. Erasmus and S. Roch, 1525; and Glorification of S. Mark. In Venice from 1535 he did fine work, e.g. frescoes in the courtyard of the convent of San Stefano; and Legend of S. Catherine. He died at Ferrara.

Pori. Seaport of Finland. The Swedish name is Björneborg. It stands on the Kumo R., on the Gulf of Bothnia, 18 m. S.E. of its harbour Mäntyluoto, and about 85 m. by rly. W. of Tampere. A municipality since 1558, it has ship repairing yards, and exports

timber, fish, and tar. The harbour of Mäntyluoto is ice-free until Jan., and that of Räfsö also serves Pori. Pop. 31,885.

Porifera. Phylum of the subkingdom Parazoa, consisting of the various forms of sponges. In this phylum are simple cellular organisms, such as constitute the Protozoa, being aggregated to form tissues. See Sponge.

Porism (Gr. *porizein*, to bring about, deduce as a corollary). In ancient mathematics, one of the divisions into which propositions in geometry were divided, the other two being theorems and problems. In a porism it was required to find something, e.g. the centre of a given circle. See Problem; Theorem.

Pork (Lat. *porcus*, hog). Uncured flesh of the hog. In Great Britain, though normally far the greater part of the consumption of pig's flesh is in the form of bacon, there is a steady demand for fresh and salted pork, which has in the past been met to a large extent from home supplies, and partly from Holland and Belgium as well as from America. In the U.S.A. and Canada, pork is a standard and favourite article of diet, while pork and beans is a staple food.

Pork is a forbidden food both to the Mahomedan and to the Jew, perhaps originally because it deteriorates rapidly in hot weather, and is therefore unsuited for use in the climate of the Mediterranean countries. Hutchison (Food and Principles of Dietetics) states that the comparative indigestibility of pork is shown by the fact that

3½ oz. required 3 hours for their digestion, as compared with 2 hours for beef. The difficulty is said to be due to the large accumulation of fat between the fibres. The fat of bacon, on the other hand, is digestible because of its granular composition. Medium fat pork contains 60.9 p.c. water, 12.3 p.c. protein and gelatine, 26.2 p.c. fat, and 0.6 p.c. ash. In very fat pork the percentage of protein and gelatine may be as low as 9.7 p.c., and the fat content reach 45.5 p.c.

Porlock. Village of Somerset, England. It is 6 m. W. of Minehead, on the edge of Exmoor, about a mile from the coast. The church of S. Dubritius is an old building restored. Porlock Bay is an opening of the Bristol Channel, about 4½ m. across, and before the sea receded this was a flourishing seaport and a market town. The old main road into Devon went up an exceptionally steep and sharp-bending hill (with gradient of 1 in 4), which is now used for motor trials. It was a person from Porlock who interrupted Coleridge in the writing of Kubla Khan. Pop. 1,351.

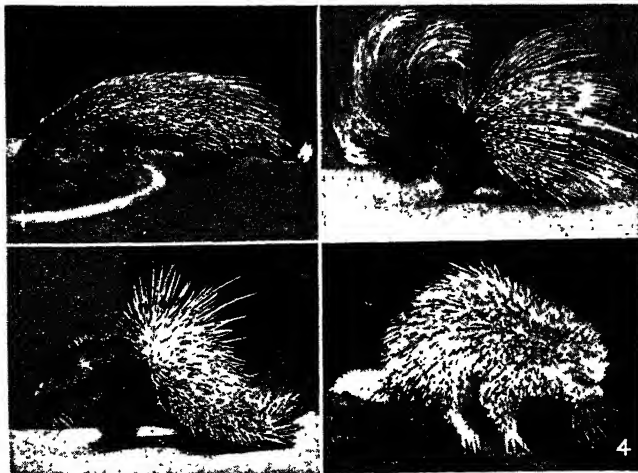
Porosity. Term used to describe the presence, in the body of a solid material, of pockets or pores of gas. Porosity may be inherent in the structure of a material, e.g. earthenware, blotting-paper, and sponge, or it may be localised and undesirable, as in defective cast metal. In water and petroleum engineering, the porosity of a reservoir rock is a measure of its fluid capacity, but it is also necessary to know the permeability (*g.v.*) which determines resistance to flow. A porous rock is not necessarily permeable, e.g. pumice. Crystalline rocks and well-cemented sedimentary rocks vary in porosity from one to 10 p.c., but cracks may considerably increase the porosity of the rock mass. Less coherent rocks may have porosities higher than 50 p.c.

Porphyrites. In geology, name given to certain types of igneous rocks. They are intrusive rocks of porphyritic texture, occurring as dikes and sills. These rocks are usually grey in colour with phenocrysts of plagioclase feldspar, hornblende, biotite, or augite, and are found in Scotland, Wales, N. America, the Swiss Alps, etc.

Porphyritic Structure. In geology, name given to a particular rock texture in an igneous rock. It is characterised by the occurrence of two distinct series of



Porcupine Grass. Spiny leaves and flower



Porcupine. 1. Brush-tailed African variety, *Atherura africana*. 2. Crested, and, 3. Long-tailed porcupines, European varieties. 4. Brazilian tree porcupine, *Syntheres prehensilis*. See page 6624

W. S. Berridge, F.Z.S.

crystals. One series forms a ground mass of extremely fine crystals, in which the other series of large well-formed crystals is embedded. These latter crystals are called phenocrysts. Rocks of this class often make beautiful ornamental stones.

Porphyrius or **Porphyry** (233-c.304). Neo-Platonist whose real name was Malchus (king). Born at Batanea in Syria, he spent most of his life in Rome and died there. Though a pupil of Plotinus, whose literary remains he edited with a biography, Porphyrius was a vigorous champion of paganism against Christianity. In one of his works he discusses the problem of the nature of universals, much debated during the Middle Ages.

Porphyry (Gr. *porphyra*, purple, fish). Name given to igneous rocks of varying composition but with porphyritic texture. The famous red porphyry used by the Romans for an ornamental stone is obtained from quarries at Jebel Dukhan, in Egypt, near the Red Sea, the site of which was long lost. Cut and polished, the rock shows bright red or white spots on a deep red background, and black or dark brown patches of hornblende, etc. The colour of the rock is due to the part conversion of the plagioclase feldspar into thulite and manganese epidote. Granite porphyries contain orthoclase, quartz, and mica, and are generally pink to grey; while syenite porphyries are almost lacking in quartz. A green variety of porphyry has a large proportion of epidote and chlorite in its composition, and was often used with the red porphyry as a contrasting ornamental stone, especially for objects of art and interior decorations. The green variety is found in Peloponnesus, and at Lambay Island, near Dublin.

Porpoise (Lat. *porcus*, hog; *pietis*, fish). Genus of aquatic mammals belonging to the order

a miniature whale, but has a more aloping head. It is found in herds or schools off the British, Scandinavian, and American coasts, frequently sporting on the surface of the water, and occasionally ascends the larger rivers. It lives on fish, and does damage at times to the herring and mackerel fishery, besides occasionally killing salmon. Formerly a popular article of food, esteemed a royal dish down to the days of Queen Elizabeth, its flesh being said to resemble pork, it is now killed mainly for its oil, a fine specimen yielding about three gallons. The so-called porpoise hide used for making boots and laces is the product of the white whale. See Mammal; Narwhal.

Porpora, NICCOLO ANTONIO (1686-c. 1767). Italian composer and music master. Born in Naples, Aug. 19, 1686, he there produced his first opera, *Basilio*. For a time director of the conservatoire at Vienna and master of the music to the king of Poland, he composed many operas, some oratorios, cantatas, masses, etc., and, in opposition to Handel, conducted the opera in London. His greatest successes were gained as a teacher.

Porsanger. Fjord penetrating the N. coast of Finnmark, Norway. It runs S. from the island of Magerö, S.E. of the North Cape. Its length is about 80 m. and its average width 10 m.

Porsena or **Porseenna**, LARS. King of Clusium in Etruria. According to the Roman legend, he led his army against Rome to restore to his throne the exiled Tarquin. An attempt to storm the city was defeated by the valour of Horatius Coclès (q.v.). Porsena now establishing a blockade of the city, a young Roman, C. Mucius Scaevola, entered his camp and attempted to murder him. Seized and tortured, Scaevola (q.v.) displayed such astonishing fortitude that Porsena abandoned the siege and made terms with the Romans.

Historical research has pronounced this legend a fabrication to conceal the complete defeat of the Romans by the Etruscans. Porsena's name, however, remains familiar to English readers because it occurs in Macaulay's *Lays of Ancient Rome*.

Porson, RICHARD (1759-1808). English scholar. Born at East Ruston, Norfolk, Dec. 25, 1759,

he went to Eton, whence he proceeded to Trinity College, Cambridge, where he had a brilliant career ending with election to a fellowship. Declining to take orders within the specified time, Porson lost his fellowship in 1792, but friends provided a fund to enable him to continue his studies in the Temple. In the same year, however, he was elected regius professor of Greek at Cambridge, but continued to live in the Temple, and in 1806 he was made librarian of the London Institution. He died Sept. 25, 1808. Porson did comparatively little, owing to his indolent disposition and intemperate habits. Among his works are editions of Aeschylus and of some of the plays of Euripides. He also restored the last 28 lines of the Greek inscription on the Rosetta stone. Consult *Life*, J. S. Watson, 1861; *Biographical Essay*, M. L. Clarke, 1937.

Porson Prize. Annual prize awarded to undergraduates of Cambridge university for the best translation of a passage of English poetry into Greek verse. Founded in honour of Richard Porson, and first awarded in 1817, it can be won more than once by the same person.

Port (from Lat. *portus*, an entry or harbour). Place where passengers and goods are landed. There are two kinds, seaports and airports; the latter, an aerodrome or flying boat base provided with customs and other facilities, where passengers are landed or taken up, is described under *Airport*.

A seaport is a harbour, natural or artificial, in which ships can lie to load or discharge. The term dates from Anglo-Saxon times and survives in many English place names, e.g. Portsmouth, Bridport. Ports are not necessarily on the coast, for that of London is some miles inland up the Thames, and large rivers like the Amazon, Mississippi, and Danube have many ports along their banks. Although London, Liverpool, Amsterdam, and other large seaports are referred to as ports, the term strictly applies only to that part of the place devoted to ships and shipping, and is usually under a separate authority, e.g. Port of London Authority, Mersey Docks and Harbour Board.



Richard Porson,
English scholar



Porpoise. Common species, *Phocaena phocaena*, found off the coasts of Britain

Cetacea or whale-like animals. The common porpoise (*Phocaena phocaena*) is about 5 to 8 ft. long, is blackish on the upper parts and white below, and in form resembles

Ports are maintained by a levy, or port dues, on all vessels using their facilities, and while ships are in port they come under the control of the authority. In most ports ships such as tankers carrying dangerous cargo are refused entry and must discharge at installations some distance away. All ports have a representative of Lloyd's, and every ship has a port of registry: the place where her particulars are kept and where she generally signs on or pays off her crew. Manning ports are naval bases where warships muster their crews. *See Dock; Harbour.*

Port, or PORT WINE. Red, rich, strong wine made near the mouth of the Douro, Portugal, and named from Oporto, where it is shipped. The vine-growing region, Alto Douro, lies mainly on the S. bank of the river, 60 m. E. of Oporto. Though cold in winter, the climate is very hot in summer, and the wine is naturally strong. The grapes, carefully gathered, are foot-pressed, usually repeated at a secondary stage in order to extract the full colour from the skins.

Before fermentation is complete, about five parts of alcohol are added to 100 of wine; after the first racking, more spirit, generally brandy, is put in the wine, and this is again repeated before shipping. Port wine thus contains from 17 to 25 p.c. of alcohol, the average amount varying from 18 to 21 p.c. Some natural, specially good, vintage port is shipped unsophisticated, soon after making, but the bulk is manufactured as described, and almost always blended.

Port is stored for a long time, being matured both in cask and in bottle. Some is kept in cask up to 20 years; always it is so kept for two years, and generally for three, or even six, before bottling. The former is a mistaken policy, as the valuable esters escape through the wood, but long rest in bottle improves the wine. Nevertheless, port should not be kept too long, as it loses its essential qualities as well as its red colour, owing to the escape of the esters. Possibly the best vintage years of the 19th and early 20th centuries were 1847 and 1927. Wine 100 years old is still to be met with in the cellars of Great Britain, but after 40 or 50 years port becomes of a sherry colour, and though often a delectable drink, it is not characteristically port wine. It may happen that the produce of a particular year, when sampled, is found to be of relatively poor quality, and therefore not worth the ageing. Port

contains from 7 to 15 p.c. of sugar, and a fair amount of tannin, much of which last is deposited as a crust in the bottle. Some white port is made, chiefly for the German market, though there is a steady sale for some brands in England. By a treaty with Portugal and two English Acts of parliament in 1914 and 1916, the description port may not be applied to any wine not the produce of Portugal; and all wine brought in as port must be certified by Portuguese authorities. *See Wine.*

Port Adelaide. Seaport of Adelaide, S. Australia. It stands on an estuary of the Gulf of St. Vincent, 8 m. N.W. of the capital, and has an excellent harbour and docks accommodating ocean liners. It is a port of call for mail steamers for Europe and Asia by both Suez and S. African routes. Wheat and other agricultural products are exported. Pop. 33,404.

Portadown. Market town and borough of co. Armagh, N. Ireland. It stands 25 m. S.W. of Belfast, on the Bann, a navigable waterway leading to Loch Neagh. The Newry Canal leads S. to communicate with Carlingford Loch. Portadown is also a rly. junction and manufactures boots, linens, and other textiles. Market days, Mon., Wed., and Sat. Pop. 13,000.

Portage (Fr. *porter*, to carry). Act of carrying something, also the charge made for the carriage of goods. In N. America a break in the chain of water communications is called a portage because here the goods have to be transferred from the canoes and carried. Portages are often caused by rapids and waterfalls. Many places in N. America bear the name of Portage, e.g. Portage la Prairie, but this is but a relic of their past, as the cutting of canals and the building of railways have done away with these obstacles to transport.

One of the most important of these portages was in Wisconsin over the tract of land between the rivers Fox and Wisconsin, which here are only 2 m. from each other. The best route from Lake Michigan to the Mississippi lay along these rivers, and the portage between them was regularly used by Indians and later by Europeans.

Portage. City of Wisconsin, U.S.A., capital of Columbia co. It is at the head of navigation on the Wisconsin river, 30 m. N. of Madison, and is served by the Wisconsin Central and other rlys. and by the ship canal between the Wisconsin and Fox rivers. Early in the 19th century a fur-trading

post, the city now has diversified small industry. There is steamboat communication with Green Bay. Pop. 7,016.

Portage La Prairie. City of Manitoba, Canada. Situated 56 m. W. of Winnipeg, it is served by the C.P.R. and C.N.R. It is the centre of a famous farming district, and its manufactures include flour, bricks, and agricultural machinery. Pop. 7,625.

Portal, WYNDHAM RAYMOND PORTAL, VISCOUNT, OF LAVERSTOKE (1885-1949). British industrialist and politician.



Lord Portal,
British industrialist

Son of Sir W. Portal, he was born April 9, 1885, and educated at Eton and at Christ Church, Oxford, becoming managing director of the firm which bore his name. Regional commissioner for Wales under the civil defence scheme in 1939, he was chairman of the coal production council from 1940, minister of works and planning, 1942-44, and deviser of the Portal prefabricated house. He succeeded his father as 3rd baronet 1931, was raised to the peerage 1935, and created viscount 1945. He died May 6, 1949.

Port Alberni. Town of British Columbia, Canada. At the head of Alberni canal, on the W. coast of Vancouver I., it is a rly. terminus. In the centre of a district rich in timber, coal, and minerals, it is the site of a huge pulp mill erected in 1947. Pop. 4,584.

Portalegre. Dist. of E. Portugal. Bounded E. by Spain and N. by the Tagus, its area is 2,405 sq. m. Mountainous in the N.E. and S., it is elsewhere level and contains the Campo de Benavilla in the S.W. It is traversed by two rly. lines from Lisbon to Spain. Wheat, coal, oil, and wine are produced; pigs are reared and textiles are manufactured. Pop. 186,373.

Portalegre. City of E. Portugal. The capital of Portalegre dist., it is 8 m. N. of its station on the Lisbon-Badajoz rly. The cathedral, founded 1556, contains fine wood sculptures. There are many prehistoric and Roman remains. Woollens are manufactured and cork is obtained locally. It is the ancient Ammaia. Pop. 12,300.

Portal of Hungerford, CHARLES FREDERICK ALGERNON PORTAL, 1ST VISCOUNT (b. 1893). British air officer. After being

educated at Winchester and Christ Church, Oxford, he was awarded the D.S.O. and bar and the M.C.



Lord Portal
of Hungerford,
British airman

during the First Great War. He commanded British forces at Aden, 1934-35, and was instructor at the Imperial Defence College, 1936-37. He then became director of organization at the Air Ministry, and shortly before the Second Great War was air member for personnel on the Air Council. In 1940 he was appointed A.O.C.-in-C., Bomber Command. Chief of the air staff, 1940-45, he reached the rank of marshal of the R.A.F. He was created K.C.B. in 1940; was raised to the peerage in 1945, and in 1946 received a viscounty and the O.M. He then became head of a dept. in the ministry of Supply dealing with work on atomic energy.

Portal System. Circulatory system formed by veins from the intestine and other main abdominal organs, which unite to form a trunk, the portal vein. This passes

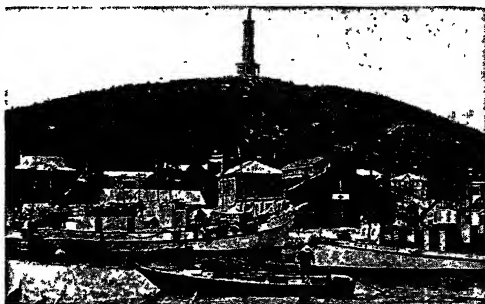
Port Antonio. Seaport town of Jamaica. Situated on the N.E. coast, 28 m. N.E. of Kingston, with which it is connected by rly., it has two good harbours, and is the chief exporting centre for the Jamaica banana trade. Pop. 5,482.

Portarlington. Market town of Eire. It is partly in Offaly and partly in Laoighis, and stands on the Barrow and a branch of the Grand Canal. It is 42 m. S.W. of Dublin, with a station of the Eire State rlys. Near the town are Emo Park and the ruins of Lea Castle. The name was given when the town became the property of the earl of Arlington in the 17th century. Until 1885 the town returned one M.P. Its representation in the Dail is now merged in the co's. In 1685 a body of Protestant exiles from France settled here. Market day, Fri. Pop. 2,094.

Port Arthur. City and town of Ontario, Canada. It stands at the

there included Lieut. Arthur. The port is a terminus of the Siberian rly. system, and has a secure harbour ice-free throughout the year.

The fortress was captured twice by the Japanese; in 1894 from China; and from the Russians in 1904-05. After the 1894 episode, it was ceded to the Japanese, but European pressure compelled them



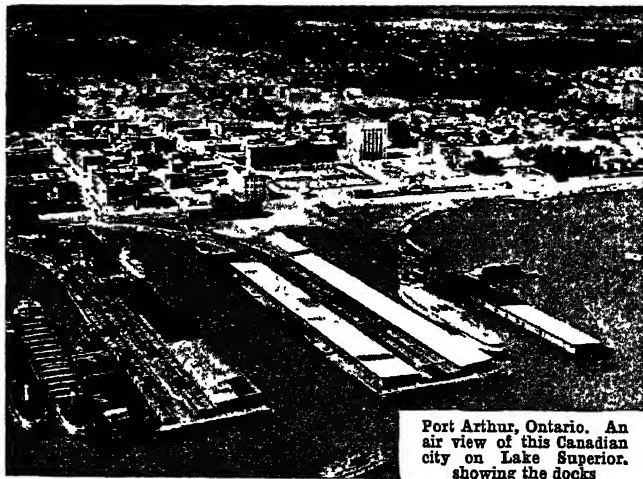
Port Arthur, Manchuria. The waterfront and hill-top memorial to Japan's victory over the Russians, 1904-05

to restore the town to China. In 1898 Port Arthur was leased to Russia with the neighbouring port of Talienwan. It was gradually converted into a Russian stronghold, and the principal base of the Russian eastern fleet.

From the outbreak of the Russo-Japanese War, which began with a successful Japanese torpedo attack on the Russian fleet in the outer harbour, the Japanese admiral Togo blockaded the harbour. The battle of Nanshan on May 26 cut off communications with the north, and Gen. Stössel was left in command with a garrison of some 47,000 men. Japanese troops began to land under Nogi on June 1.

After seven months of stubborn defence and fierce attack, Stössel surrendered on Jan. 2, 1905, having only 24,000 effectives and 15,000 wounded and sick left out of his 47,000. The Japanese lost 92,000 men, 58,000 killed and wounded, as well as 34,000 sick.

By the treaty of Portsmouth, New Hampshire, 1905, Port Arthur was ceded by the Russians to Japan, and in 1915 the Chinese extended the lease for a further period of 99 years. After Japan's defeat in the Second Great War, Russian airborne troops landed at Port Arthur, Aug. 22, 1945. By a clause in the 1945 treaty of alliance between the U.S.S.R. and China, Port Arthur was to be used jointly as a naval base by the U.S.S.R. and China for a period of 30 years; but under the Russo-Chinese pact of 1950 it was to be handed over to China by 1952 or on the signing of peace with Japan.



Port Arthur, Ontario. An air view of this Canadian city on Lake Superior, showing the docks

into the liver, where it again subdivides into smaller vessels, breaking up into a capillary network, as it does not carry the blood directly to the heart.

Portamento (Ital., carrying). Musical term for a vocal effect obtained by sliding from one note to another. Used with restraint it is a legitimate means of expression, but it may easily be vulgarised, and as frequently employed by untrained singers it is a fruitful source of faulty intonation.

head of Lake Superior, 991 m. W. of Montreal and 423 m. E. of Winnipeg, and is served by C.P.R. and C.N.R. It has a fine harbour, ships quantities of grain to Montreal and elsewhere, and in addition to large grain elevators, has shipbuilding yards, sawmills, blast furnaces, foundries, etc. Pop. 24,426.

Port Arthur or LUSHUN. Fortified seaport at the S.W. end of the Liao-tung peninsula, Manchuria. The English name dates from 1860, when a naval surveying party

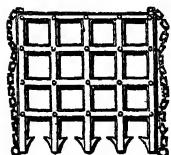
Port Augusta. Seaport of S. Australia. It stands at the head of Spencer Gulf, 190 m. N.N.W. of Adelaide by rly., and is the starting point for both transcontinental rly. routes, one to Kalgoorlie, 1,000 m. away, and the other to the Northern Territory. Repair work to rly. rolling stock is carried out at Port Augusta, which is the outlet of a district of gold, silver, copper, iron, and coal mines, and of a pastoral area producing wheat and wool. Ostrich farming is carried on. Pop. 4,350.

Port-au-Prince. Capital and chief seaport of Haiti, West Indies. Situated on the W. coast, at the head of the Gulf of Gonaïves, it has a secure harbour which ships coffee, hides, and logwood. Sugar is treated in the neighbourhood. There are a cathedral, schools, and up-to-date cable and telephone services. A light rly. runs to Lake Assuei, a motor road to Cap Haitien, and there is a weekly air service to the U.S.A. In the palace, on Aug. 7, 1912, President Lecomte was burned to death. Pop. est. 115,000. See Haiti.

Port Bannatyne. Watering-place of Buteshire, Scotland. It stands on Kames Bay, 2 m. from Rothesay. The chief industry is fishing. John Sterling was born here. Near by is Kames Castle, which mainly dates from the 14th century. Pop. 695.

Port Chalmers. Port of South Island, New Zealand, 8 m. N.W. of Dunedin, for which it is the deep water port. Distant 190 m. from Lyttleton and 1,343 m. from Melbourne, it has wharves, warehouses, graving docks, etc. Pop. 2,165.

Portcullis (Fr. *porte*, gate; *coulisse*, a groove). In military architecture, a strong, timber-framed grating like a harrow, made



Portcullis. Defensive grating of medieval castles

to slide up and down in stone grooves in the portals of fortified castles. The vertical spikes were pointed with iron at the bottom, so as to strike into the earth or to pierce the bodies of those attempting to force an entrance. The portcullis was a feature of early Norman and later medieval strongholds. A long entrance passage frequently had a succession of them. See Castle; Fortification.

Port de la Paix. Town and seaport of Haiti, West Indies. It stands at the mouth of the Trois



Port Bannatyne, Buteshire. The town and bay from the west

Rivières, on Tortuga Channel, and carries on a trade in coffee, cocoa, etc. Pop. 5,000.

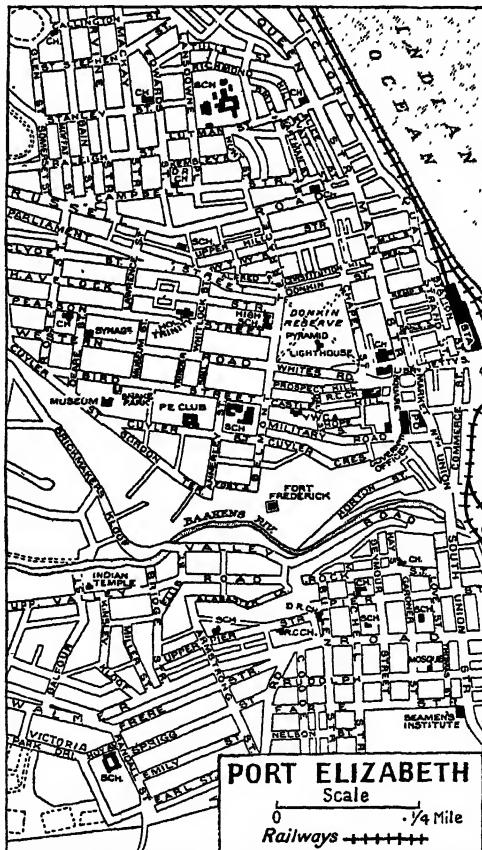
Porte or **SUBLIME PORTE.** Term formerly used for the government of Turkey. It comes from an Arabic word for gate which was translated into French as *porte*, and thus passed into general use in Great Britain. This special use of the word bears relation to the Eastern custom of administering justice at the gates of cities and royal palaces. The term went out with the end of the Ottoman Empire.

Port Edgar. Harbour of the British crown colony of the Falkland Islands. It is situated on the S.E. coast of W. Falkland I.

Port Elizabeth. Seaport of Cape Province, S. Africa. It stands on Algoa Bay, 714 m. S. by W. of Johannesburg and 841 E. of Cape Town, with both of which it is connected by rly. The Baakens river runs through the town. The chief buildings are the city hall, public library, museum, post office, and hospital. The churches include the R.C. cathedral and S. Mary's, Anglican. The market buildings contain large halls, one called the feather market hall.

The town has a theatre, opera house, and drill hall. There are three public parks, S. t.

George's, Victoria, and Prince Alfred. To the N. of St. George's Park is an old Scottish cemetery. The town is a shipping and distributing centre. The breakwater was removed in 1869, but a new harbour scheme, put into effect early in the 20th century, and completed by 1941, gave the port an enclosed harbour 314 acres in area. This scheme involved the building of a new breakwater, 4,850 ft. long. The industries include the manufacture of boots, flour, and jam. It is important, too, as a market for the sale of wool and ostrich feathers.



Port Elizabeth, S. Africa. Plan of the city and its railways



Port Elizabeth, S. Africa. Main street of this flourishing town in Cape Province

Port Elizabeth, frequently called Algoa Bay, was originally Fort Frederick, a fort erected to guard the roadstead, and named after Frederick, duke of York. In 1820 it was settled by a number of British immigrants. The town was laid out and named after Elizabeth, wife of Sir Rufane Donkin, then governor of the Cape. Pop. 146,231 (64,745 white).

Porteous Riots. Two affrays between the Edinburgh populace and the city guard in 1736. At the execution on April 14 of a smuggler named Wilson, who had robbed the Pittenweem custom house, the crowd assaulted the guard, which, led by its captain, John Porteous, opened fire, killing five or six persons. Porteous was convicted of murder but respited, and the citizens dragged him from the Tolbooth prison and hanged him in the Grass Market on Sept. 7. None of the rioters, who were protected by influential people, was arrested. The house of lords demanded for the disaffected city severe penalties, which were reduced by the commons to the dismissal of the provost and a payment to Porteous's widow. Scott described the affair in *The Heart of Midlothian*.

Porter. Dark, bitter beer, brewed from browned malt, containing from four to six p.c. of alcohol. It was largely drunk by market porters in the 18th century, and was so named about 1750. It is less in demand in the U.K. than formerly, but is still popular in Eire. See *Brewing*.

Porter, COLE (b. 1892). American song writer, born at Peru, Ind., June 9, 1892. He was educated at Yale and Harvard, and studied composition under d'Indy. His scores for revues and musical plays were popular in New York and in London, where Wake Up

Kern could be compared with him.

Porter, DAVID DIXON (1813-91). American sailor. Born at Chester, Pa., June 8, 1813, he first served under his father, an admiral in the Mexican navy, but in 1829 entered the U.S. service, in which he became lieutenant in 1841. At the outbreak of the Civil War he was sent to relieve Pensacola. By a daring and well-executed action he opened the Mississippi for Farragut to capture New Orleans, 1862. In command of the Mississippi squadron, Porter took part in the operations at Arkansas Post and Vicksburg, and in 1863 was promoted rear-admiral, receiving the thanks of congress. Next year he commanded the N. Atlantic blockading squadron, concluding his war services with the capture of Port Fisher, Jan. 15, 1865. In 1870 he was promoted admiral. He died in Washington, Feb. 13, 1891.

Porter, ENDYMION (1587-1649). English royalist. Member of a Gloucestershire family with Spanish connexions, he was brought up in Spain. After returning to England he became groom of the bed-chamber to Charles, prince of Wales. From 1622 he was sent to Spain on various diplomatic missions. A loyal servant of King Charles, he voted against Strafford's attainder, and was expelled

and Dream brought him to the fore in 1929. Best remembered are *The Gay Divorce*, *Nymph Errant*, and *Anything Goes*. He also wrote for films. Some of Porter's tunes—*Night and Day*, *In the Still of the Night*, *Begin the Beguine*—remain as classics of sophisticated dance music, in which idiom only Gershwin and

from parliament. He left England in 1645, and lived in France and the Netherlands until 1649, when he returned to London to die, being buried in S. Martin-in-the-Fields, Aug. 20. He acquired a fortune and was a patron of art and letters. *Consult* *Life and Letters*, D. Townshend, 1897.

Porter, GENE STRATTON (1868-1924). American author. A native of Indiana, she became the wife of Charles Darwin Porter in 1886. She was a keen naturalist and an able photographer of animal and bird life. She is remembered for her "best-selling" novels, most of which deal with out-of-door life in a pleasantly sentimental and cheerful tone. Among them were *Song of the Cardinal*, 1902; *Freckles*, 1904; *A Girl of the Limberlost*, 1909; *Laddie*, 1913. She died Dec. 7, 1924. *Consult* *Life and Letters*, J. Stratton-Porter, 1928.

Porter, JANE (1776-1850). British novelist. Born in Durham and brought up in Edinburgh, she achieved great success in 1803 with her first novel, *Thaddeus of Warsaw*, a story of Polish exile. This was followed in 1810 by *The Scottish Chiefs*, the hero of which is Wallace. Among other works are *The Pastor's Fireside*, 1815, and *Sir Edward Seaward's Narrative*, 1831. She died at Bristol, May 24, 1850.



Jane Porter
After G. Harlowe

Porter, WILLIAM SYDNEY. Real name of the American short-story writer, O. Henry (*q.v.*).

Port Erin. Watering-place of the Isle of Man. It stands on the S.W. coast, 15 m. by rly. S.W. of Douglas at the head of a land-locked inlet, Port Erin Bay. There is a harbour, but the breakwater is now a ruin. The place has golf links and good bathing, while the



Port Erin, Isle of Man. Town and bay from the S., looking towards Bradda Head
The Times

scenery around is an attraction. Here are a fish hatchery and a marine biological station. Pop. 3,200.

Port Fairy. Town and harbour of Victoria, Australia, 186 m. by rail W.S.W. of Melbourne. It is a centre of trade in wool, grain, and dairy produce; also a tourist resort. Pop. 2,000.

Portfolio (Lat. *portare*, to carry; *folium*, leaf). Flat case for carrying papers. The word is also applied to the office of a minister of state, presumably because the minister is responsible for all the documents appertaining to his department. Minister without portfolio is a term used to describe a cabinet minister who has no departmental duties. Such functionaries were not uncommon in France and other countries before they were appointed in the U.K. during the First Great War.

Port Glasgow. Mun. bor. of Renfrewshire, Scotland. It stands on the left bank of the Clyde,



Port Glasgow arms

20 m. N.W. of Glasgow, and has a rly. station. The chief edifices are the town hall, town buildings, and library. Birkmyre Park is a public recreation ground, and near are the ruins of Newark Castle. The industries are chiefly connected with shipbuilding, and the burgh has wet and dry docks, shipbuilding yards, iron foundries, and works for making rope and sailcloth. Port Glasgow arose from the village of Newark. In 1668 the baillies of Glasgow bought the land from the Maxwells and built a harbour, making it the seaport of Glasgow, hence its name. In 1710 it was made the chief custom house port for the Clyde, and in 1775 was created a burgh. During the 19th century Glasgow gradually absorbed the trade of the Clyde owing to the deepening of the river, which permitted liners to reach the Broomielaw at Glasgow; at Port Glasgow, however, shipbuilding developed into a great industry, and a trade with Canada and the West Indies was maintained. Pop. 20,063.

Port Harcourt. Seaport of Nigeria. It stands on one of the largest creeks entering the Bonny and New Calabar rivers, about 30 m. from the mouth of them, in Nigeria. A precipitous cliff rises to a height of 45 ft., and there is a depth of 50 ft. alongside, conditions unknown elsewhere in this part of Africa. It is the

terminus of the rly. which crosses the Benue at Makurdi, joining the western rly. at Kaduna Junction. It was named after the 1st Viscount Harcourt when, as Lewis Harcourt, he was Colonial sec.

Porthcawl. Seaside resort and urban dist. of Glamorgan, Wales. It is 30 m. by rly. W. of Cardiff. The chief building is the church of St. John the Baptist. The town is visited for all kinds of holiday recreation. Pop. 10,000.

Port Herald. Town and river port of the Nyasaland Protectorate, S. Africa. Situated on the Shire river, it is 214 m. by water N.W. of Chinde, at the mouth of the Zambezi, and 61 m. by rly. N. of Chindio, the terminus of the rly. from Blantyre to the Zambezi. It is a port of shipment for coffee, cotton, and groundnuts.

Port Hope. Port and town of Ontario, Canada, in Durham co. Situated on Lake Ontario, 63 m. E.N.E. of Toronto, and served by the C.P.R. and the C.N.R., it has a good harbour, and is a watering-place as well as a market for the local produce, mainly fruit. Here is the only radium plant in Canada. Pop. 5,006.

Porthos. Character in Dumas's romances, *The Three Musketeers*, *Twenty Years After*, and *Le Vicomte de Bragelonne*. He is one of the famous trio of musketeers; a vain, titanic hero who dies magnificently at bay in the third of the romances. See *Aramis*; *Athos*.

Port Huron. City and port of entry of Michigan, U.S.A., the co. seat of St. Clair co. A popular summer resort, it stands at the mouth of St. Clair river, on Lake Huron, 61 m. N.E. of Detroit, and is served by rlys. and by lake and river steamers. Industry began with the discovery of a salt deposit in 1882; now a shipping trade is carried on, and among manufacturing establishments are boiler and engine works, rly. workshops, plants for machinery, motor vehicles, and agricultural implements. The river separates Port Huron from Sarnia, Ont., but a tunnel and bridge connect the cities. Stretching along the lake are some 100 m. of beaches. The village of Port Huron was laid out in 1849 and became a city in 1857. Pop. 32,759.

Portia. Leading female character in Shakespeare's *Merchant of Venice*. A wealthy heiress, wooed by Bassanio, she learns that Antonio stands in danger of forfeiting his life by his inability to repay money he has borrowed from Shylock, the Jew, to equip

her lover for his wooing. Portia disguises herself as a doctor of law and outwits the Jew in the trial scene, during which she delivers the speech, "The quality of mercy is not strained." Ellen Terry excelled in this part.

Portici. Town of Italy, in the prov. of Naples. It stands on the Bay of Naples at the W. base of Mt. Vesuvius, 5 m. by rly. S.E. of Naples. In 1631 it was destroyed by an eruption of Vesuvius. It has an 18th century palace and a museum of antiquities. Fishing, silk-worm rearing, and the manufacture of silk are the most important industries. Adjoining the town is Resina (*q.v.*). Pop. 14,500.

Portion. In English law, that which a parent gives to a child in order to set him up in life; or, in other words, his share of the parental inheritance. Equity leans against double portions, and therefore if a parent has, by his will, left a share of his estate to a child, and, after making his will, but before his death, has given the child the same amount or something equivalent, a court of equity will presume that he meant the gift to be in satisfaction of the legacy; and the child will not be allowed to have both, to the impoverishment of other children.

Portioner. In Scots law, a female heir at law, corresponding to a coparcener in English law. All portioners inherit equally the inheritable estate of a common ancestor dying without male issue. In ecclesiastical usage the term portioner is applied to a minister who serves a benefice jointly with others, and receives only a portion of the tithes or benefits of the living, and also to the portion commonly allotted to a vicar out of a rectory or impropriation.

Portishead. Urban dist. and watering-place of Somerset, England. It stands on the estuary of the Severn, 11 m. W. of Bristol, with a rly. station. For details of the docks here, see Bristol, Port of. S. Peter's is an old church, and near the town are traces of an ancient camp. Pop. 3,908.

Port Jackson. Harbour of New South Wales, Australia. Formed by the estuary of the Parramatta river, it was discovered and charted in 1770 by Capt. Cook, who named it after Sir George Jackson (1725-1822), then secretary to the Admiralty. In 1778 Capt. Arthur Phillip established on the S. shore a convict settlement which developed into the city of Sydney. The entrance to Port Jackson is a

mile wide, and the harbour has a total area of 21 sq. m., the largest vessels in the world being able to enter at any state of the tide. The island of Cockatoo has a naval dockyard. In 1932 a 2½-m.-long bridge spanning the W. end of Port Jackson was completed. (See Sydney.) Port Jackson is the chief port of Australia, and in the Second Great War was an important Allied base.

Port Jervis. City of New York, U.S.A., in Orange co. It stands at the junction of the rivers Navesink and Delaware, 87 m. by rly. N.W. of New York City, and is served by the Erie and the New York, Ontario and Western Rlys. It is a popular summer resort, and has rly. repair shops, iron foundries, and silk, glove, stove, and glass factories. Pop. 9,749.

Port Kembla. Port of New South Wales, Australia. It is situated 50 m. S.W. of Sydney, and grew, during the 20th century, into an important industrial centre, with iron and steel works prominent among its factories. With neighbouring Wollongong it utilises to the full the resources of the nearby coalfields, and its harbour, with an area of 330 acres and a depth of 20 to 50 ft., has wharfage accommodation for large vessels.

Portland. Peninsula of Dorset, England, known as the Isle of Portland. Connected with the mainland by part of Chesil Bank, it is 4½ m. long, with an average breadth of one mile. A rly. line runs down the pen. from Weymouth. Portland can also be reached by steamer from Weymouth.

Portland is noted for its building stone, the quarries being crown property. On the E. side is the prison; opened in 1848, this has accommodation for 800 men, and was used for convicts, many of whom worked in the quarries, until the First Great War. In 1921 it was made into a Borstal institution. There is a castle, built in the 16th century, and still used officially; also remains of a much older one. Pennsylvania Castle

was built about 1800 by a member of the Penn family.

Portland has a harbour of refuge, used by the navy. Known as Portland Roads, it covers 2,200 acres, and is protected by gigantic breakwaters built by convict labour. The largest of them cost over £1,000,000. The harbour is strongly fortified. The inhabitants, who live by fishing and pasturing sheep, retain some old customs. As the Isle of Slingers, Portland is the scene of Hardy's story, *The Well-Beloved*. It forms an urban district. Pop. est. 17,000.

Portland. Name of three towns in Australia. One is in New South Wales, in Roxburgh co., 12 m. N.W. of Lithgow on the rly. to Mudgee. The second is in Victoria, in Normanby co., on the coast of the W. side of Portland Bay; it is an agricultural centre

by coasting steamers. Among its chief buildings are the city hall, the Federal building, the co. court house, the observatory, the Masonic building, and a public library containing well over 100,000 volumes. The capacious harbour (frontage 8.5 m.), across which is a fine bridge connecting the city with South Portland, is defended by several forts. The public parks cover over 100 acres.

It carries on a considerable export trade. Among its manufacturing establishments are lumber mills, machinery and marine engine works, and boot and shoe, hat, furniture, paint, stove, and boiler factories. The city has ship-building yards, large grain warehouses, and is a fishing centre.

The first settlement here was made in 1633, the place being first known by its Indian name of



Portland. Air view of the chief commercial city of the state of Maine, U.S.A.

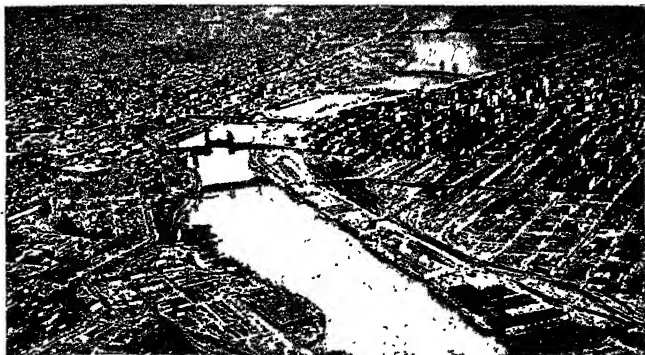
and rly. terminus 200 m. W.S.W. of Melbourne. The third is in S. Australia, in Adelaide co.

Portland. A city of Maine, U.S.A., the co. seat of Cumberland co. The largest and chief commercial city of the state, it stands on Casco Bay, 106 m. N.N.E. of Boston, and is served by the Grand Trunk and other rlys., and

Machigonne. Its early inhabitants were troubled by Indian attacks, and in 1690, in conjunction with the French, these foes destroyed the settlement. In 1718, after peace had been made with France, settlers again made their homes here, calling the place Falmouth. The townsfolk took the side of the colonists in the struggle for independence, for which a British fleet damaged their town in 1775. In 1786 the name Portland was given to part of Falmouth, and the present municipality arose. It was the capital of Maine in 1820-32. Longfellow was born here and the city has several mementoes of the Longfellow and Wadsworth families, some of them housed in the poet's early home. In 1866 damage estimated at £2,000,000 was done by a fire that broke out during the celebration of July 4. Pop. 73,643.



Portland, Dorset. View of the town and railway track over part of the Chesil Bank which forms the approach from the mainland



Portland, Oregon, U.S.A. Air view of the town, showing the Willamette river

Portland. Largest city of Oregon, U.S.A., the co. seat of Multnomah co. It stands at the confluence of the Columbia and Willamette rivers, 53 m. N. by E. of Salem, and is served by the Great Northern and other rlys., and by ocean-going and coasting steamers. The buildings include the city hall, court house, art museum, and public library. The Episcopal cathedral is one of many churches. Here is the medical department of the state university. The city has a zoological garden and about 350 acres of public parks.

Portland has an extensive harbour, accessible by the largest vessels, and carries on an important export trade in flour, grain, and lumber. Its industrial establishments include lumber and flour mills, foundries and machine shops, iron-works, and furniture, saddlery, soap, candle, and paint factories. There are also canning and meat-packing houses. During the Second Great War Portland was the point of departure for goods sent to Russia under lease-lend; war activity caused a great and sudden increase in its pop. Shipbuilding became an important industry during the war years.

Portland was founded in 1845, and as its founders came from Maine they called it after Portland there. In 1873 it was damaged by fire, but it soon recovered. It had been made a city in 1851, and in 1891 East Portland and Albina were added to it. In 1905 a great exhibition was held here, in honour of the visit of two explorers, Meriwether Lewis and William Clark, to this district a century before. At the head of a small party, they were the first white men to cross the continent from south to north. Pop. (1940) 305,394.

Portland, BATTLE OF. Fought between the English and the Dutch, Feb. 13-20, 1653. Tromp

was sailing home along the Channel, convoying a merchant fleet, and the English ships were watching for him. Off Portland he attacked some of them under Blake and Deane, and the battle continued all day, the rest of the English ships coming up one by one to the fight. Neither side secured any advantage, but, owing to lack of ammunition, Tromp was unable to renew the fight on the following morning. He therefore made haste home and the battle resolved itself into a pursuit by the English. In this, although many of his ships left him, Tromp showed great skill in keeping the pursuers at a distance. The Dutch, however, lost heavily in both warships and merchantmen during the retreat.

Portland, EARL AND DUKE OF. English titles, the former held by the family of Weston and both by that of Bentinck. Sir Jerome Weston, an Essex landowner, had a son Richard, who entered parliament and was sent abroad on business by Charles I. In 1628, being in high favour with the king, he was made lord high treasurer and created Baron Weston. In 1633 he was made earl of Portland, and he held the office of treasurer until his death, March 13, 1635. His three successors were all loyal to the Stuarts, and the title became extinct when, in 1688, the 4th earl died abroad.

The earldom was revived in 1689 by William III for his Dutch favourite, William Bentinck, and his son Henry was made duke of Portland in 1716. The 3rd duke, separately noticed, was twice prime minister of England, and the 5th was the eccentric recluse wrongly asserted to have lived a double life, masquerading also as T. C. Druce, a tradesman in Baker Street, London. On his death, in 1879, a nephew became the 6th

duke, being succeeded as 7th duke in 1943 by his son William Arthur Henry Cavendish-Bentinck (b. March, 16, 1893). An eldest son is called the marquess of Titchfield. The chief residence of the family is Welbeck Abbey, Notts. The valuable London property around Welbeck Street, Portland Place, and Baker Street owned by the 5th duke was left by him to his sisters, one of whom was Lady Howard de Walden. The Portland Town estate, London, was sold by Lord Howard de Walden for £500,000 in 1920.

Portland, HANS WILLIAM BENTINCK, EARL OF (1649-1709). English politician. He was born of a



Earl of Portland, English politician
After Simon de Bois

noble Dutch family, July 20, 1649, and came to England first as a confidant to William, prince of Orange. On his master's accession to the crown, Bentinck was created earl of Portland, and sworn of the privy council, April 9, 1689. Henceforth he was William's confidential adviser, and conducted several diplomatic missions with skill. In command of a regiment of Dutch horse, he rendered distinguished service at the battle of the Boyne, July 1, 1690, and received the Garter seven years later for work on the treaty of Ryswick. His death took place Nov. 23, 1709.

Portland, WILLIAM HENRY CAVENDISH-BENTINCK, 3RD DUKE OF (1738-1809). British statesman.



3rd Duke of Portland, British statesman
After Stothard

The eldest son of William, 2nd duke, he was born April 14, 1738. He entered parliament in 1761, succeeded to the dukedom next year, and in 1765 became a member of Rockingham's cabinet. In 1766 he married the daughter of the duke of Devonshire, whose surname of Cavendish he assumed by royal licence in 1801. During the ministry of North, Portland was in opposition, but held office again in 1782, when he was appointed lord lieutenant of Ireland. In April, 1783, he became nominal head of the Fox-North coalition government, resigning in Dec. He was Home secretary 1794-1801,

and again became premier in 1807, resigning just before his death, which occurred on Oct. 30, 1809.



Portland Vase. The Roman cameo-glass vase now in the British Museum

Portland Beds. In geology, name given to a sub-division of the upper Jurassic system of rocks. The strata of the Portland Beds lie above the Kimmeridge Clay and below the Purbeck Beds, and are typically developed at Portland, Dorset. The beds consist of limestones and sands, contain many fossil shells, and are used for building stones. See Jurassic.

Portland Bill. Cape of the English Channel. It forms the bold and rocky extremity of the Isle of Portland, Dorset. Between it and the Shambles Sandbank is a dangerous stretch of water, the race of Portland. Near by is a lighthouse, with a light visible for 18 m. See Portland.

Portland Cement. A full description of this material will be found under Cement.

Portland Channel OR CANAL. Fjord on the Pacific Coast of N. America. It stretches almost due N. for 100 m., and separates the S. end of the Alaskan mainland from British Columbia.

Portland Club. London social club. Named after the duke of Portland, it was founded in 1816. The house is at 18B, Charles Street, W.1. This is recognized as the chief English card-playing club, hence the phrase, Portland Club rules.

Portland Stone. Oolitic limestone of upper Jurassic age quarried on Portland Bill. Of this cream-coloured building stone many of the great London buildings are composed, or partly so, e.g. St. Paul's Cathedral. Its even texture is such that it can be cut and worked

in any direction without fear of later disfigurement by weathering. See Portland Beds; Oolite.

Portland Vase. Fine example of cameo-glass of the early Roman empire. An amphora, 9½ ins. high, its blue glass body has an opaque white overlay cut in relief, illustrating the Peleus and Thetis story. Formerly in the Barberini palace, Rome, it passed into the Portland family, who deposited it on loan in 1810 in the British Museum. Shattered by a madman in 1845, it was skillfully restored. Josiah Wedgwood made 50 earthenware reproductions. In 1929 the vase was sent by the duke of Portland to Christie's, but was withdrawn at 29,000 guineas. In 1945 it was sold to the British Museum at a figure not disclosed.

Portlaoighise OR **PORT LEIX** OR **MARYBOROUGH.** Market town and co. town of Laoighis, Eire. It stands on a tributary of the Barrow, 51 m. by rly. S.W. of Dublin. There was a castle here in the Middle Ages, some slight remains being extant, but the town really dates from 1560. It was then named Maryborough and made the capital of the new Queen's co. It was incorporated in 1570, and sent two members to the Irish parliament from 1585 to 1800. There are a market hall, court house, and infirmary, and the industries are connected with agriculture. Near the town is a rock with ruins of a castle where the kings of Leinster lived. Market day, Thurs. Pop. 12,000. *Proz.* Portleesh.

Port Louis OR **ISLE OF FRANCE.** Capital and seaport of Mauritius, on the N.W. coast. There are Anglican and R.C. cathedrals, botanical gardens, astronomical and meteorological observatories. Subject to hurricanes, the town has special shelters, and high kerbs and deep gutters. Exports include sugar, aloe fibre, and coconut oil. Many of the traders are Indians and Chinese. Pop. 66,805.

Port Macquarie. Inlet on the coast of New South Wales, Australia, at the mouth of the Hastings river. The township of the same name is a seaside resort, 174 m. N.N.E. of Sydney by sea, and exports cobalt.

Portmadoc. Market town, seaport, and holiday resort of Carnarvonshire, Wales. It stands on

Tremadoc Bay, 16 m. S. by E. of Carnarvon, and has a rly. station. The commodious harbour exports slates, which come by a narrow-gauge rly. from Blaenau Festiniog. Portmadoc stands upon land reclaimed by a man named Madocks. Market day, Fri. Pop. 4,200.

Port Mahon. Spanish naval station and seaport. It is the capital of Minorca, Balearic Isles, and is the ancient Portus Magonis. At the head of an inlet on the E. coast, its harbour is one of the best in the Mediterranean, and is fortified. It was occupied by the British, 1708-56 and 1762-82, and was ceded to Spain in 1802. The church of Santa Maria has a remarkably fine organ. There are few traces of the ancient walls of the town; most of the buildings are of stone. It has an arsenal. Pop. 17,500.

Portman Square. London square. At the S.W. end of Baker Street, Marylebone, W., it is named after William Henry Portman (d. 1796), owner of a large estate in Marylebone. Begun about 1764 and completed about 1784, it has always been a fashionable quarter. Earl Nelson, elder brother of the sailor, lived here, and Lord Nelson himself is said to have resided at No. 9. Mrs. Montagu held her salons at Montagu House (q.v.), at its N.W. angle. At No. 32 Caroline of Brunswick stayed with Lady Anne Hamilton, author of *The Secret History of the Court of England*. No. 15, once No. 12, was occupied by the 10th duke of Hamilton, and became the town residence of Princess Louise, wife of the 1st duke of Fife. No. 33 is h.q. of the Poetry Society.

Port Melbourne. Seaside suburb of Melbourne, Australia. Situated at the head of Hobson Bay, the N. portion of Port Phillip, it has numerous docks and wharves. It was formerly known as Sand Ridge.

Port Moresby. Capital, the seat of government, and the chief seaport of Papua. Dating from 1873, it is on the S. coast, on



Port Moresby, Papua. General view of this Pacific seaport, showing the bay

the sheltered and picturesque Fairfax Harbour, and is in communication with Sydney by steamer. When Japan attacked New Guinea in the Second Great War, Port Moresby was heavily attacked from the air on Jan. 23, 1942, but preparations for an amphibious assault on the town and port were upset by the U.S. naval victory of the Coral Sea (*q.v.*). An overland advance against the port from Buna and Gona was held in Sept. by Australian troops when the Japanese were only 32 m. from the town. As Allied strength mounted, the town became the advance base of Australian forces in New Guinea. Copper deposits occur near.

Port Natal. Harbour of Natal, S. Africa. On it developed the chief port of the colony, Durban, and the name is sometimes used as a synonym for that city, although strictly applying only to its harbour.

Port Nolloth. Seaport of Namaqualand, S. Africa. It is on the N.W. coast of the Cape Province, and is chiefly interested in the shipping of copper, being the terminus of the rly. line that runs to the mines at Ookiep. It is also visited by pleasure seekers, for whom there is fishing. The climate is very dry, water being brought in tanks by the rly. from 5 m. inland. Sea fogs are frequent. There is regular steamer communication with Cape Town.

Porto. Dist. of Portugal, in the prov. of Entre Minho-e-Douro. Named from its chief town, Oporto, it is hilly in the E., level by the coast, and is well served by rlys. Area, 880 sq. m. Pop. 938,288.

Porto Alegre. City of Brazil, capital of the state of Rio Grande do Sul. Situated at the convergence of the Jacuhy and other navigable rivers, near the N. end of Lagoa dos Patos, 160 m. N.N.E. of Rio Grande, its harbour is commodious and provided with docks. A large area of reclaimed land has been used as a site for modern buildings, both business and residential. It has a cathedral, technical schools, and government buildings, manufactures food products, chemicals, furniture, and textiles, and exports cattle, salted beef and pork, hides, tobacco, Paraguayan maté, beans, and cereals. It is the terminus of several lines of rlys. to the interior. An active river trade is carried on by steamers with the agricultural colonies in the N. part of the state. It has two civil airports and a military one. Ocean liners make it a port of call. Pop. 321,628.

Porto Amelia. Settlement on the shores of Pemba Bay, Mozambique, about 120 m. N. of the port of Mozambique. It was under the administration of the Nyasa Company, and became in 1907 the capital of the district. The town was laid out by the Spilsbury expedition in 1900. In 1915-16 Pemba Bay formed the base for the operations of the Portuguese against the Germans in German East Africa.

Portobello. Watering-place of Midlothian, Scotland, part of the city of Edinburgh. It stands on the Firth of Forth, 3 m. from Edinburgh proper, with a rly. station. It is a popular seaside resort, and has some manufactures. Portobello was a separate burgh, with its own provost and council, until 1896, when it was included in Edinburgh. The name is supposed to have been taken from a cottage built here in 1742 by a sailor who had taken part in the capture of Porto Bello in 1739. See Edinburgh. Pop. 9,900.

Porto Bello. Seaport of Panama, on the N. side of the isthmus. It stands on the Caribbean Sea, 24 m. N.E. of Colón. Once commercially important, its prosperity has declined. Drake, having died at sea, was buried in the bay. The port was taken by the British under Vernon in 1739, when the fortifications were demolished. There are many famous ruins of its earlier greatness, including those of the fort, the cathedral, and the treasury.

Porto Empedocle (formerly Molo di Girgenti). Seaport of Sicily, in the prov. of Agrigento. It stands on the S. coast, 5 m. by rly. S.W. of Girgenti, for which it is the port. Here are large warehouses of the Girgenti sulphur and corn merchants, who export great quantities of these commodities. Pop. 11,400.

Porto Ferrajo or PORTOFERRAIO. Town of Italy, in the prov. of Leghorn. It is the capital of the

island of Elba, and is on the S. slopes of a citadel-crowned hill on the N. coast of the island. Here are two residences used by Napoleon when in exile. W. of the town is a large foundry. The lighthouse on the hill is a well-known landmark. There are good sea-bathing establishments, and here is maintained one of the few maritime commands left to the Italian navy after the Second Great War. Pop. 5,000. See Elba, *illus.*

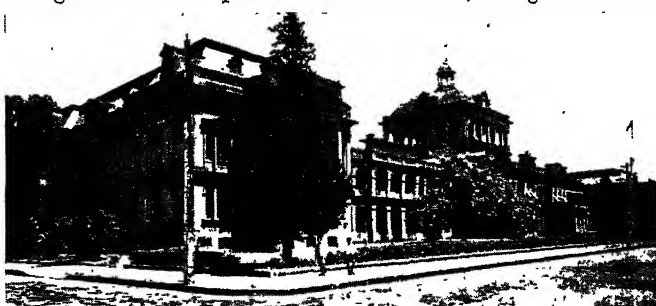
Port of London Authority. Corporate body, established by Act of parliament in 1908 to con-



Port of London Authority. Headquarters of the corporation at Trinity Square, London

trol the tidal portion of the Thames, from Teddington Lock to the estuary, 70 m. in length. It controls the five dock systems between London Bridge and Tilbury, accommodating ships up to 35,000 tons, and covering over 4,000 acres. The members are partly nominated by the government and the L.C.C. and partly elected by shipowners and merchants. Revenue is derived from dues and charges on ships entering and leaving the port. The offices are at Trinity Square, London, E.C.3.

Port of Spain. Seaport of Trinidad, British W. Indies, and capital of the island. Situated on the E. coast, facing the Gulf of



Port of Spain, Trinidad. The government building known as the Red House

Paria, its harbour is a port of call for many lines of steamers. A finely built town, with wide streets, it has Protestant and R.C. churches, botanical gardens, in which is the governor's residence, a royal college, etc. Commercially it has supplanted St. Thomas, and exports cocoa, sugar, asphalt, coconuts, copra, rum, and petroleum, besides re-shipping produce from Venezuela. It is also known as Spanish Town. Pop. 107,499.

Porto Grande OR **MINDELLO**. Seaport of St. Vincent, Cape Verde Islands. A coaling station and the commercial centre of the archipelago, it stands on the N.W. coast of the island and has an excellent harbour.

Portogruaro. Town of N. Italy, in the prov. of Venice. It stands on the small river Lemene, $1\frac{1}{2}$ m. above the site of the ancient Roman military station of Concordia. It is a rly. junction 42 m. N.E. of Venice and is the seat of a bishop. Pop. est. 3,000.

Porto Maggiore. Town of N. Italy, in the prov. of Ferrara. It is close to the W. shore of the lagoon, Valle del Mezzano, at the N.W. corner of the Adriatic Sea, and is 15 m. S.E. of Ferrara and a rly. junction on the route between Ferrara and Ravenna. During the Second Great War the parish church, containing the Pietà by Mazzoni, was destroyed. Pop. (commune) est. 20,000.

Porto Maurizio OR **IMPERIA**. City of Italy, capital of the prov. of Imperia. It is a seaport and health resort on the Italian Riviera, 70 m. by rly. S.W. of Genoa. Picturesquely placed on a promontory, the old part of the town is on a hill, while modern villas, hotels, etc., line the shore. Surrounded by olive groves, it exports an excellent oil, as well as wine, fruit, and flowers. It has a fine domed church (1799). Included in the commune since 1928, when its name was changed to Imperia, is Oneglia, 2 m. N.E. Both towns are frequented for sea-bathing. The port and industrial area were damaged during the Second Great War. Pop. 28,540.

Porto Novo. Harbour of Madras state, India, on the Coromandel coast, in S. Arcot dist. It is at the mouth of the small Vellar river on the Madras-Tuticorin main rly. The settlement was originally made by the Portuguese in the latter part of the 16th century. The Dutch maintained a factory until 1678. Here Sir Eyre Coote defeated Haidar Ali in 1781. Pop. 19,000.

Porto Novo. Seaport and the capital of Dahomé, French W. Africa. The residence of the lieutenant-governor, it is situated at the E. end of a lagoon which is in communication with the other coastal lagoons. A narrow-gauge rly. goes 50 m. N. to Ipobe. Pop. 27,483.

Porto Praia OR **VILLA DA PRAIA**. Portuguese port, capital of the island of São Thiago, Cape Verde Islands. Situated on the S. coast of the island, with a good harbour, it contains a palace of the governor-general, an observatory, museum, and a cable station. In the bay, Porto da Praia, an English fleet defeated a French one, April 16, 1781. Pop. 28,000.

Porto Rico. This U.S. possession in the W. Indies is now usually spelt Puerto Rico (*q.v.*).

Portoviejo. Town in Manabí prov., Ecuador. About 110 m. N. of Guayaquil, it is on the river Portoviejo and connected by rly. with Manta on the Pacific. Wool, carpets, and capes are manufactured, and the weekly fair is celebrated. Pop. 15,000.

Portpatrick. Seaport and watering-place of Wigtownshire, Scotland. It is 7 m. S.W. of Stranraer on the rly., and 21 m. from the coast of N. Ireland. About 1600 it was made a station for the packet service to Ireland, but this ceased in 1849. In 1821-43 large harbour works were constructed at a cost of £500,000, but these were allowed to fall into ruin, as the expected trade did not develop. The place has a little trade, and is visited as a seaside resort. Pop. 1,100.

Port Phillip. Harbour of Victoria, Australia. The largest indentation on the Victorian coast, it is 30 m. from N. to S., and 30 m. across at its widest part. Melbourne and its suburbs are on the N., and Geelong on the W. Discovered in 1802, and used as a penal settlement in 1803, it was first colonised in 1835, and gave its name to Port Phillip dist., which in 1851 became Victoria. It was named after Arthur Phillip, first governor of N.S.W. See Melbourne.

Port Pirie. Seaport of S. Australia. It stands on Spencer Gulf, 136 m. by rly. N.W. of Adelaide, being a junction. It has smelting works for Broken Hill mines, one of the largest silver-lead works in the world. It exports ore and wheat. There are high and technical schools. Pop. 11,677.

Portraiture. In a general sense all representational art is portraiture, but the term is particu-

larly applied to the art of drawing, painting, carving, or modelling likenesses of human individuals—also, latterly, to their mechanical representation by means of the photographic camera. The history of portraiture is inseparable from the general history of art, for almost the earliest known manifestations of human art abound with idealised portraits of individual human beings, *e.g.* the Egyptian statues of their kings. At its highest rating it is a means by which men may be honoured; at its lowest it is a concession to human vanity. Yet it may well be neither of these when the artist chooses his own subject, but simply his solution of an artistic problem which has engaged his interest, in which the importance of the sitter's personality is of little concern to him. Whistler, for example, claimed no more than this even for his famous portrait of his mother, which professed to be only an exercise in tone values. Orpen's painting of the Chef at the Chatham (*see* Orpen *illus.*) was primarily the result of the painter's desire to produce a fine picture rather than of any desire to immortalise the chef; and the same may be said of many of Rembrandt's magnificent portraits. This kind of portrait may, in a way, reveal as much of the painter as of his subject. Nevertheless a tradition has been evolved through the ages of portraiture as a special branch of art, the purpose of which is to preserve for posterity the semblance of the outer physical features of a man or woman and as much of the inner character as those features can express. Many great artists have taken portraiture in their stride, *e.g.* Raphael, Titian, Rubens. Others have been pre-eminent in the art, *e.g.* Holbein, Lely, Van Dyck, Rembrandt, Hals, Velasquez, Reynolds, Gainsborough, Romney, Ingres, and in more recent times, Sargent, Orpen, Augustus John, Sir William Rothenstein, and (in sculpture) Jacob Epstein. As may be gathered from this list, the British contribution to portraiture, as to landscape, has been notable. The British genius seems to be as well suited to the delineation of individual human character as of the varying moods of nature. Perhaps the British love of tradition and the homage they pay to the record of what is past and gone has also helped to foster the art. These characteristics are demonstrated in the many private collections of family portraits, and on a wider scale in the unique collection of "national family por-

traits" contained in the National Portrait Gallery (*q.v.*). See Caricature; Miniature Painting.

Portree. Seaport of Inverness-shire, Scotland. It stands on Portree Bay, on the E. side of the Isle of Skye, 120 m. N.W. of Oban. The capital of Skye, it is the chief business centre of that island, and is also visited by tourists. From the harbour there is steamer communication with the mainland. The name is said to come from Port à roi, given because James V once landed here. Pop. 2,100.

Portreeve (Lat. *porta*, gate). English municipal officer. Until the 11th century the chief civil officer of a mercantile town was called the portreeve. The equivalent later title was mayor. See Sheriff.

Port Royal. Seaport and naval station of Jamaica. Situated at the end of a long, sandy tongue of land enclosing the harbour, 4 m. direct S.W. of Kingston, the capital, it is strongly fortified, has a royal naval dockyard, arsenal, barracks, military hospital, etc., and is the headquarters of the British naval forces in the West Indies. The town was destroyed by earthquake in 1692, by fire in 1702, by hurricane in 1722.

Port-Royal. Name of a famous Cistercian convent in France and of a school of theological thought to which it gave rise. Founded in 1204 by Mathilde de Garlande, the convent stood between Versailles and Chevreuse, in the valley of the Yvette. Early in the 17th century it underwent a great revival under Jacqueline Arnauld and members of her family, who had the sympathetic support of S. Francis de Sales, Pascal, and others, and, removing to Paris in 1626, in 1633 began a new life in the Faubourg St. Jacques. The convent there was known as Port-Royal de Paris.

A male community of recluses being formed, the old building, Port-Royal des Champs, was restored for their accommodation, and became a centre of Jansenism, educational activity, in which the Paris house joined, and anti-Jesuit propaganda. In the intervals of their devotional exercises, the recluses of Port-Royal devoted themselves to literary, agricultural, and mechanical labours. The system of teaching the young the

elements of learning, and at the same time imbuing their minds with a sense of piety, was inspired by the Abbé de St. Cyran, one of the most notable of Jansen's colleagues. Among the many distinguished students was Racine. The teaching, a modified form of Cartesianism, aimed more at moral than at intellectual results, but special attention was paid to the

ings were destroyed, by order of Louis XIV, Jan. 22, 1710. Though the inmates had been accused of plotting the ruin of the R.C. church, it was proved against them in this connexion only that while they held the pope infallible in matters of faith, they thought he might be deceived as to fact. See Arnauld; Jansenism; Pascal.

Bibliography. Mémoires pour Servir à l'Histoire de Port-Royal, A. Arnauld, ed. B. de la Bruyère, 1742; Port-Royal, C. Beard, 2 vols., 1861; Port-Royal, C. A. Sainte-Beuve, 6th ed. 1901; The Nuns of P.-R., M. E. Lowndes, 1909; Little Schools of P.-R., H. C. Barnard, 1913; Strangers and Sojourners at P.-R., R. Clark, 1932.

Portrush. Urban dist., seaport, and watering-place of co. Antrim, N. Ireland. It stands on Ramore Head, 67 m. N.W.

of Belfast, and has a rly station. An electric line connects it with Giant's Causeway, 7 m. away, and near also are the ruins of Dunluce Castle. The buildings include a town hall.

Portrush has a harbour whence steamers go regularly to Liverpool and Glasgow. For visitors there are golf links, recreation grounds, and good bathing. Pop. 2,953.

Port Said. Town in Egypt, at the N. entrance of the Suez Canal. It stands on land reclaimed from the sea, and was founded in 1859, when the first surveys for the canal were made. Here are the offices of the Suez Canal Co. and various mercantile and steamship offices. Port Said, named after Said Pasha, the promoter of the canal, is of great importance as a coaling station and a shipping centre for Suez traffic. Pop. 124,749. See Suez Canal. *Pron.* Sigh-id.



Portrush, N. Ireland. Ruins of Dunluce Castle, formerly a stronghold of the earls of Antrim

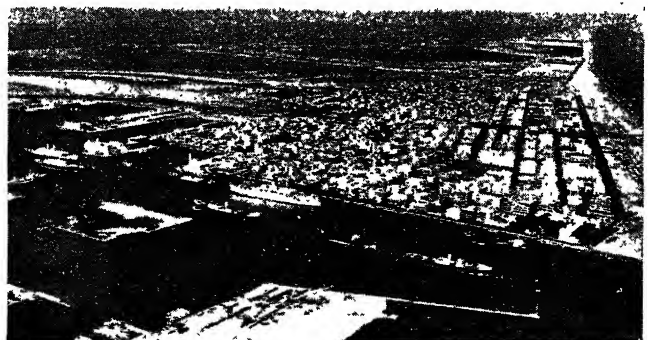
study of the French language. In addition to Greek, Latin, and Italian grammars, the works issued included the influential Art du Penser, or Logique de Port-Royal, 1659, in which Arnauld and Nicole were chief collaborators.

Political jealousy of its success and ecclesiastical opposition to the teaching of Port-Royal attracted many powerful enemies, and though Pascal and Anne of Bourbon, duchesse de Longueville, succeeded in saving it for a time, the recluses were eventually forced to vacate Port-Royal des Champs for Les Granges, a farm near by. St. Cyran was accused of heresy and imprisoned for five years at Vincennes, surviving his release only by a few months (1643).

Finally, the remaining members of Port-Royal having been expelled without mercy in 1709, the build-



Portrush arms



Port Said, Egypt. Aerial view of the town and harbour

Portsea. Peninsula of Hampshire, England, known as the island of Portsea. It lies between Portsmouth and Langstone Harbours, and is about 6 m. from N. to S. On it stands Portsmouth, part of which is known as Portsea.

Port Side. In nautical language, the left-hand side of a ship when looking forward. In fairways or crowded waters, ships must always pass each other port to port. (See Navigation.) A ship is said to be on the port tack when she is sailing with the wind blowing on the port beam. The opposite of port is starboard. The old term for port side was larboard. The port wing of an aeroplane is that on the left-hand side when looking towards the nose of the fuselage. A ship or plane carries a red light to port at night.

Portslade. Urban district and industrial and residential town of Sussex, England. Situated 4 m. W. of Brighton, on the E. arm of Shoreham Harbour canal, it has a rly. station. Pop. 13,000.

Portsmouth. Co. bor., city, and seaport of Hampshire, England. It covers Portsea I. and



Portsmouth arms

extends for a considerable area on to the mainland. It lies 74 m. S.W. of London and is served by rly. On the opposite side of the harbour is Gosport (q.v.). The harbour has a narrow entrance, but afterwards expands into a basin 4 m. by 2 m., spacious enough to accommodate a large part of the Royal Navy. The old Victory, Nelson's flagship,

was moored in the harbour until 1920; in 1923 she underwent a thorough restoration and was berthed here in the oldest dry-dock in the world. A system of fortifications surrounds Portsmouth, the chief naval arsenal of Great Britain, known to sailors as "Pompey." The forts on the Isle of Wight and Portsdown hill, and those standing in Spithead complete the perimeter. The dockyard covers nearly 300 acres, has twelve docks ranging in depth from 21 to 36 ft., dry-docks, building slips, a school of naval architecture, and many establishments connected with the production of the requirements of the navy. In 1923 the torpedo school (H.M.S. Vernon) was transferred from old ships to new buildings on the Gun wharf. At Whale I. (H.M.S. Excellent) there is a great



Portsmouth. Pre-war buildings and scenes in Great Britain's chief naval depot. 1. Cathedral church of S. Thomas & Becket. 2. George Hotel, where Nelson spent his last night ashore: destroyed by bombs, 1941. 3. Municipal College, in Town Hall Square. 4. The Town Hall. 5. Parade ground of the Royal Naval Barracks

honour attended Henrietta, duchess of Orléans, who visited her brother Charles at Dover in 1670. Louise was later sent as a secret French emissary to London, and before 1672 was recognized as the king's

borough Pool. The estate, laid out in 1888 by Messrs. Lever Bros., Ltd., covers an area of 235 acres, and the 1,300 attractive cottages, well spread out, are let to workers in the great soap factory at fav-

roadway was laid across a swamp, searchlights and signal towers were installed, and camps and jetties sited. The port was ready to operate when Japan entered the war, and provided a refuelling and defence base for convoys, the first of which put in on Jan. 3, 1942. The existence of Port T was kept secret until July 15, 1945.

Port Talbot. Seaport and borough of Glamorganshire, Wales. It stands on Swansea Bay, 11 m. E.S.E. of Swansea, and has rly. stations. It has large docks and employs many in collieries, steel



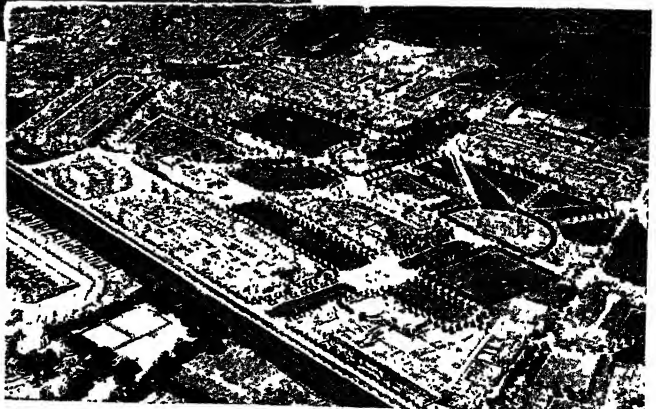
mistress. In July she bore him a son, who was created duke of Richmond, and next year she was created duchess of Portsmouth. Her insatiable avarice made "Madam Carwell" extremely unpopular in England, and after Charles's death she returned to France, dying in Paris, Nov. 14, 1734. *Consult* Life, H. Forneron, Eng. trans. 1887.

Portsmouth, TREATY OF. Peace that in 1905 ended the war between Russia and Japan. After the defeat of Russia at Mukden, the U.S. President T. Roosevelt in June, 1905, suggested that peace negotiations should be begun. Both sides accepted the invitation, and on Aug. 10, Kamura and Takahira met de Witte and Rosen at Portsmouth, N.H. The treaty signed on Sept. 5 recognized Japan's dominant position in Korea, while Russia ceded the southern half of Sakhalin and the leased territory of Liaotung. Both parties agreed to evacuate Manchuria, which, excepting the leased territory, was restored to China. There were other minor provisions. *See* Russo-Japanese War.

Port Stanley. Seaport and capital of the Falkland Islands (*q.v.*). It stands on Port William Inlet, on the N.E. coast of East Falkland. Whale products, wool, hides, and seal fur are the chief exports. Pop. 1,246.

Port Sudan. Seaport of the Anglo-Egyptian Sudan, on the Red Sea. It is the terminus of a rly. from Atbara. The port is the centre of a considerable traffic with the Sudan in gum, cotton, sesame, senna, and ivory. The harbour is well equipped for handling coal. Salt pans provide a local industry.

Port Sunlight. Industrial model village of Cheshire, England. It lies 3 m. S. by E. of Birkenhead, in the bor. of Bebington, has a rly. station, and is reached from the river Mersey by a tributary, Brom-



Port Sunlight, Cheshire. Estate comprising 1,300 cottages let to workers in the Lever soap factory. Top, entrance to the art gallery

ourable rents. There are a church, school, hospital, library, gymnasium, theatre, recreation grounds, and welfare institutions. The Gladstone hall, opened 1891, Hulme hall, 1901, and art gallery, 1922, are among public buildings. *See* Leverhulme, Viscount.

Port Swettenham. Seaport on the Strait of Malacca in Selangor, Malaya. It dates from 1901, when the rubber of the Federated Malay States required a port for export; much earth was dumped on a tidal flat, mangrove-covered, at the mouth of the Klang and Langat rivers, a passenger jetty and three wharves were built, the rly. was extended from Klang, and the port came into existence. Bombed by the Japanese in Dec., 1941, it was overrun by them in early Jan., 1942, and remained in their hands until they surrendered in Malaya, Sept. 12, 1945.

Port T. Secret British naval base of the Second Great War. It was established on Addu Atoll, a waterless coral islet 500 m. from Colombo and 3,000 m. from Australia. Construction began in Sept., 1941, and was accomplished under difficult conditions, 25 p.c. of the workers falling sick. A four-mile

and tinplate works, and rly. works. Port Talbot was founded in the 19th century on land owned by the Talbot family. In 1921 it was created a borough, absorbing the existing borough of Aberavon, the urban dist. of Margam, and some rural areas. Pop. 38,440.

Port Tewfik. Town of Egypt. Situated at the Red Sea entrance to the Suez Canal, it stands on the W. bank, a residential quarter of the town of Suez. In the Second Great War it was a centre for landing and distribution of men and supplies for Imperial troops operating in the Western Desert.

Port Townsend. City of Washington, U.S.A., the co. seat of Jefferson co. It stands on Puget Sound, 40 m. N.N.W. of Seattle, and is served by the Northern Pacific Rly. and by steamers. Its harbour is one of the finest and most commodious in the world. The export trade is chiefly in lumber, grain, dairy produce, livestock, and oil; and among industrial establishments are foundries and machine shops, sawmills, boiler works, paper and pulp works, and fish canneries.

Port Transport Worker. This is the official style of a docker (*q.v.*).

PORTUGAL: THE LAND AND THE PEOPLE

Alfonso Lopez, A. D. Innes, and others

See the articles on the cities and towns, statesmen, navigators, and men of letters of Portugal; also those on Goa, Mozambique, and other Portuguese colonial possessions. See also Europe

Portugal is a republic of S.W. Europe, lying between lat. 37° and 42°N. The ancient Lusitania, it is bounded N. and E. by Spain, and S. and W. by the Atlantic Ocean. It is a maritime country. Its greatest length, from N. to S., is 358 m., and its greatest breadth 141 m.



Portugal Arms of the Republic

Its area is 34,254 sq. m., or, with the Azores and Madeira Islands, officially included with continental Portugal, 35,490 sq. m. Pop. (est.) 7,950,000 and 8,484,700 respectively.

Portugal possesses colonies in Africa and Asia as follows: Cape Verde Islands, Guinea, Principe and St. Thomas Islands, Angola, Mozambique, Goa, Din, Timor, Macao, etc.; total area, 803,835 sq. m.; total pop. 10,954,500.

Physically, Portugal is an integral part of the Iberian peninsula, most of its mts. and rivers being prolongations of those of Spain. The longest river rising in Portugal is the Mondego, in Beira. The largest mt. range is the Serra da Estrella, 6,540 ft. Farther S. is the Serra d' Ossa, a continuation of the Sierra Morena, and, still farther S., the Serra de Monchique. The chief rivers are the Minho, which forms part of the N. boundary; the Guadiana, which forms part of the S.E. frontier: the Douro, and the Tagus (Port. Tejo). The coast, some 500 m. in length, is generally low and flat, except near the Tagus and Cape St. Vincent. Apart from the estuaries of rivers, the only deep indentations are the bay of Setubal and the Ria de Aveiro or Aveiro lagoon, S. of Oporto. The only islands are the Farilhões and Berlengas. Among the minerals found are sulphur, copper, wolfram, lead, coal, tin, silver, gold, iron, kaolin, etc. Salt is obtained from the Aveiro lagoon and other salt-marshes.

Proximity to the sea tempers Portugal's climate and, except in sheltered valleys and exposed parts of Alemtejo, the climate generally is equable and temperate.

The indigenous flora embraces the usual plants of N. Europe, but imported semi-tropical varieties also flourish, and include the

agave, eucalyptus, maple, Portugal cypress, magnolia, Barbary oak, carob-tree, myrtle, palm, aloe, and tree-fern. There are large forests of oak and cork trees, and the botanical forest garden of Busaco is one of the richest in Europe. The fauna of Portugal resembles that of Spain. In the Estrella mts. wolves are found.

The people are of mixed origin. The primitive Iberian stock has been crossed with invading Carthaginians, Romans, Celts, Jews, Arabs, and negroes. In the N. the Galician Spanish type prevails, in the centre the Arabic, and in the S. the negroid. All, however, were much influenced by the Visigothic invasion, and but little by the Spaniards. The Moorish invasion, both physically and intellectually, was the most powerful factor in determining the present type. Inter-marriage was so general that there arose a class called the Mozarabic, which was Arabic in tongue and manners, Christian in religion, and Portuguese in blood. The conquests in Africa introduced a new type, since the tolerant habits of the people interposed no racial bar against Africans, even negro slaves. The contemporary Portuguese are a kindly, hospitable, artistic, sober, and patriotic people, though somewhat shiftless, and, in the rural districts, rather superstitious. The chief towns are Lisbon, the capital (pop. (1940) 709,179), and Oporto (262,309), the

only two which have a pop. in excess of 50,000. Portugal is divided into eleven provs.: Algarve, Alto Alemtejo, Baixo Alemtejo, Beira Alta, Beira Baixa, Beira Litoral, Douro Litoral, Estremadura, Minho, Ribatejo, and Trás-os Montes e Alto Douro. (See articles under these names.)

CONSTITUTION. The constitution of 1911, adopted after the fall of the monarchy, was suspended in 1928 following the proclamation of Gen. Antonio Carmona as president, and five years later a system of government called the *Estado Novo* was established. It provides for a president elected for seven years by direct vote of the citizens, men and women; he appoints the prime minister and the other members of the cabinet on the recommendation of the prime minister. The national assembly sits for three months in the year. Origin-



Portugal. Map of the Republic

ally of 90 members, this number was increased to 120 in 1945; the only candidates put forward in 1934, 1938, 1942, and 1945 were those of the National Union, although the electoral law allows more than one list of candidates. There is another chamber, constituted on a corporative basis, and including representatives of local authorities, to which all bills introduced into the national assembly must be submitted.

Justice and Local Administration

For judicial purposes Portugal is divided into 157 *comarcas*, in each of which there is a lower court. There are three courts of appeal sitting in Lisbon, Oporto, and Coimbra, and a supreme court in Lisbon.

The antiquated and cumbersome reis currency was abolished in 1911, and the gold escudo (*g.v.*) of 100 centavos, was substituted.

For local government and administrative purposes the provs. are divided into dists. named after their chief towns, and the dists. into councils or communes (*concelhos*), governed by elected councils, including a mayor appointed by the state; *concelhos* are subdivided into *freguesias* (parishes), administered by a *junta de paroquia* and a *regedor*, nominated by the governor of the district, to represent the communal mayor.

RELIGION AND EDUCATION. The bulk of the people are R.C. There are Protestant churches and missions in some of the larger towns, but the number of Protestants is small. Portugal is divided into three ecclesiastical provs., Lisbon, Braga, and Evora, each with its own archbishop. The Azores, Madeira, and the W. African colonies, with five sees, form part of the prov. of Lisbon. The archbishop of Lisbon is called the patriarch, and of Braga the primate. Conventual establishments were formally suppressed by law in 1894, their property being confiscated by the state; this law was enforced by the provisional govt. of the republic in Oct., 1910. The R.C. Church was separated from the state, by decree, in April, 1911. In 1917 the banishment imposed on the clergy by the law of separation was annulled, and relations with the Vatican, which had been broken off in July, 1913, were resumed in 1918. Under a concordat and a missionary agreement signed with the Vatican, May 7, 1940, Church property which had come into the possession of the state was

restored, except where it was used for public services.

Primary education is free and in 1911 became in theory compulsory; but nearly 50 p.c. of the pop. above 7 years old are unable to read or write. There are three universities, at Coimbra (founded 1290), Lisbon (1911), and Oporto (1911). There are various kinds of private schools, including over 1,700 primary schools, many secondary and ecclesiastical schools and seminaries, and industrial, technical, and commercial schools. There are also colleges of art and music, and naval, military, and other special schools. Each district capital and three other towns have state lycéums.

ARMY AND NAVY. The Portuguese army is raised by conscription, and is divided into the active, the reserve, and the territorial army. The peace establishment of the active army is fixed at 35,000 men with some 4,600 officers. All adult males are liable to serve six yrs. in the active army, 16 in the reserve, and six in the territorial army. The republican guard numbers 5,500 and 220 officers, and includes a cavalry regiment, the fiscal guard 5,000 and 100 officers. A volunteer legion numbers 49,000 and 3,400 officers. The navy consists of six sloops, five destroyers, five gunboats, three submarines, and some other craft; personnel consists of some 600 officers and 5,500 men. Military aeroplanes of all types number about 100.

INDUSTRIES. The soil is very fertile, except in the mountainous parts; more than 60 p.c. of the pop. is engaged on the land, but agriculture is backward, nearly 40 p.c. of the cultivable land being still undeveloped. Forests cover 19 p.c., or over 4,000,000 acres, with pine, oak, cork trees, and chestnut. The vine is the most generally cultivated plant, and wine the most important product. In the mountainous regions rye is grown, and sheep and goats reared; in the N., maize and cattle are raised; in the S., wheat and swine, large herds of pigs fattening in the vast oak forests. Olive trees cover nearly 1,000,000 acres; figs, tomatoes, onions, oranges, lemons, nuts, etc., are grown; silkworms and bees are reared. Cork is another important vegetable product, Portugal producing more of the material than does the rest of the world.

Oxen are used for agricultural work and transport. Solid wooden

wheels for the ox-carts, and ploughs formed of branches, are relics of the Roman occupation, while the irrigation machinery and wells are reminiscent of the Moors. Fish abound; immense quantities of sardines are caught, cured, and tinned for exportation; many tunny fish are caught, and oysters are exported.

The principal manufacturing industry is the production of textiles, including linen, silk, woollen, and cotton fabrics. Metal and earthenware goods are also produced. One distinctive Portuguese industry is the manufacture of porcelain tiles (*azulejos*); the name and the industry were originally Moorish. There are large cooperages, necessitated by the wine trade, and articles manufactured of cork are largely exported. Other industries are leather, glass, paper, gold and silver filigree manufactures, lace, and the embroideries of Madeira.

A. Lopez

HISTORY. Portugal had no distinct political existence in ancient or early medieval times. In the 10th century A.D. the greater part of the Spanish or Iberian peninsula was in the hands of the Moors. In the second half of the 11th century, Ferdinand I and Alfonso VI of Castile drove the Moors to the S., and recovered for Christianity the lands as far as the river Tagus. In 1094 Alfonso bestowed the recently annexed prov. upon his son-in-law, Henry of Burgundy, as the county of Portugal or Porto Callo. Henry's son, Alfonso I, fought valiantly with the Moors, extended his dominions, captured Lisbon, and assumed the title of king instead of count in 1140, the year after the famous victory of Ourique, won against the Moors. The status of Portugal as an independent kingdom was recognized by Castile in 1143.

Growth of the Kingdom

The small Portuguese kingdom continued to wage successful war against the infidels, and to prosper under a line of efficient rulers, who, besides fighting vigorously, were not neglectful of the progress of the people. Sancho I was one of the few European monarchs who successfully resisted the claims of domination of the mightiest of the popes, Innocent III. Portugal was extended to what were virtually its permanent limits in the reign of Alfonso III (1248-79), whose predecessor, Alfonso II, had been the first to summon the *cortes*, or national council. Alfonso's successor, Diniz, is regarded as the founder of

Portugal's commercial and industrial activities, but war with the Moors and struggles to resist the dominion of Castile were the chief occupation of his son, Alfonso IV, the Brave. The struggle with Castile was finally decided by the brilliant Portuguese victory at Aljubarrota, Aug. 14, 1385, in the reign of John I (1385-1433). John's marriage to Philippa, daughter of John of Gaunt, the father of Henry IV, king of England, gave rise two centuries later to the claim to the English throne put forward by Philip of Spain, whose mother was a Portuguese princess, through whom he had already claimed the Portuguese crown.

The Maritime Empire

John's long and wise reign laid the foundations of the Portuguese maritime empire, a work of which the prime promoter was his younger son, Prince Henry, called the Navigator, under whose direction expedition after expedition sailed from the shores of Portugal, discovered the Canaries and the Azores, and crept round the great western shoulder of Africa. Other maritime states were absorbed with the traffic in the Mediterranean and the seaboard of Western Europe. The south was left to the Portuguese, who, while John II (1481-95) was engaged, like so many other monarchs of the time, in establishing the supremacy of the crown over the feudal nobility, reached the extreme south of the Dark Continent. In 1488 Bartholomew Diaz first doubled the Cape of Good Hope, and in 1497 Vasco da Gama crossed the Indian Ocean, and reached the shores of India, at Calicut. Three years later the Portuguese sailors discovered Brazil, the eastern shoulder of South America. The famous bull of Pope Alexander VI (1493) bestowed upon the Portuguese all new lands which had been, or might be, discovered E. of a line which was ultimately drawn from N. to S. 270 leagues W. of the Azores, while all territory W. of that line was to go to Spain.

For 80 years Portugal enjoyed a monopoly of the southern and eastern seas. With her tiny population, she could not acquire wide territory, and even her purely maritime empire, despite the wealth it brought her, imposed too heavy a strain on her capacities. In 1580, when the direct male line of the kings came to an end, the crown was claimed, through his mother, by Philip II of Spain, despite the better title of the House of Braganza. Philip had no difficulty in enforcing his claim, though the English tried to win the throne for

an illegitimate pretender, Don Antonio. In effect, Portugal was annexed by Spain. In the 17th century, however, the Spanish monarchy was striving to suppress all provincial rights and liberties, and the Portuguese, roused to revolt in



Portugal. Map showing distribution of natural wealth and the principal industries of the people

1640, proclaimed John of Braganza king. The rivalry between France and Spain ensured for the new claimant the support of France, though it was not till the struggle had lasted 28 years that the House of Braganza was decisively established on the independent throne of Portugal by the treaty of Lisbon. Recognition of the dynasty by the marriage of Charles II to Catherine of Braganza, 1661, confirmed the friendly association, embodied in a treaty of 1737, of Portugal and Great Britain.

Peninsular War

But Portugal, once the queen of the seas, was now no more than an insignificant European state, though she still held possession of her American colonies, of the Brazils, and of trading settlements in the Indian Ocean. Externally, her political significance lay mainly in the fact that she provided an open gateway for the British into the Spanish Peninsula. Portugal was the base of the British peninsular campaigns in the War of the Spanish Succession (1701-1713) and the Peninsular War (1808-1814).

In 1807 Napoleon resolved to sweep Portugal into the net of his continental system directed against the commerce of England; but King John, faithful to the friendship with Great Britain, chose exile in preference to submission, and withdrew to Brazil, where he established the headquarters of the Portuguese government. Napoleon's attempt to seize Portugal, and Spain also, brought about the British intervention and the Peninsular War. After the fall of Napoleon, King John remained in Brazil, leaving the Portuguese administration in the hands of the British. But in 1820 John returned to Portugal, assigning Brazil as a separate empire to his son, Pedro IV. Pedro, on his accession to the Portuguese throne in 1826, resigned it, while retaining the Brazilian empire, in favour of his daughter Maria da Gloria.

A prolonged struggle followed between the reactionaries, headed by Pedro's brother Miguel, who claimed the crown, and the constitutionalists, with the young queen as their figure-head, in which the victory of the latter was not secured until 1834, chiefly through the protection extended against foreign intervention, first by Canning and then by Palmerston. Portugal felt the general political unrest which was disturbing Europe; the party contests between the advanced democrats, known as the Septembrists, and the moderate constitutionalists, called Chartists, as supporters of the charter of 1826, were frequently acute.

Fall of the Monarchy

The crown in Portugal enjoyed prerogatives which gave it a controlling power, while the popular assembly became increasingly democratic. King Carlos, who came to the throne in 1889, was a monarch of liberal views, who was frequently forced by circumstances to adopt a repressive course of action, while the administration generally, captured by a corrupt type of politician, was the real cause of the misgovernment for which he was blamed. While discontent ran high, the king and the crown prince were assassinated at Lisbon, Feb. 1, 1908. The young prince Manoel was raised to the throne, but he was driven from the country by a revolution in Oct., 1910. Portugal was proclaimed a republic Oct. 5, 1910.

A. D. Innes

A provisional government was formed with Theophilo Braga as acting president, and he was replaced on Aug. 24, 1911, by Dr. Arriaga, who held office as full president till May 29, 1915. The

policy of the republic separated the Church from the state, and decreed the abolition of the religious orders; this played into the hands of the monarchists, and led to armed royalist incursions in 1911, 1912, and 1913, the last being the most serious; but all were defeated.

In March, 1916, Portugal declared war on the side of the Allies, Bernardino Machado being then in power. German ships in Portuguese ports were seized, and the German colony was expelled. In spite of a revolutionary movement in Dec., 1916, and later industrial unrest, Portugal sent forces numbering some 65,000 officers and men to serve in France. Some 35,000 European Portuguese troops and upwards of 100,000 native askaris took part in the war in Angola and in the fighting for German E. Africa. The peace conference of 1919 allotted to Portugal the territory, formerly German, S. of the Kuvuma.

Period of Unrest

April, 1917, saw the break up of the republican coalition Machado had formed, and in Dec. a military revolution, under the leadership of Sidonio Paes, was successful after four days' bloodshed. Paes, elected president in April, 1918, was shot in the following Dec. In Jan., 1919, a strong revolutionary effort under the royalist Couceiro failed, but unrest continued. In a new revolution in Oct., 1921, engineered by a group of republicans in the army, the premier Granjo and two colleagues were assassinated. A series of short-lived ministries followed, and abortive revolutionary attempts were frequent. In May, 1926, a successful revolution, again led by the army, resulted in the deposition and banishment of the president, Machado. Commander Cabecadas, a leader of the revolt, who represented the politicians, formed a govt., but his serious differences with the military leaders soon led to his resignation, and his minister of war, Gen. Gomes da Costa, became prime minister and acting president; a few weeks later, da Costa was deposed and banished, being succeeded by his foreign minister Gen. Antonio de Bragosa Carmona. Parliament was suspended, and the country was free of disturbance until Feb., 1927, when a revolt broke out, first at Oporto and then at Lisbon, which was quickly suppressed, though not without much bloodshed. In March, 1928, Carmona was elected president, and a new govt. was formed, with Col. José Vicente de

Freitas as premier. The minister of finance in this cabinet, Dr. Antonio de Oliveira Salazar, succeeded de Freitas as prime minister in July, 1932, and continued in office through the Second Great War, and after; from Sept. 5, 1944, until Feb. 3, 1947, he was both premier and foreign minister.

Portugal remained neutral during the Second Great War, Lisbon, the capital, being a hive of intrigue and diplomatic activity as the "listening post" of all interests on both sides of the struggle. An event of great importance to the Allied cause was the granting to the U.K. in Oct., 1943, under the treaty of 1373, of facilities in the Azores for the setting up there of air and naval bases. The bases were returned to Portugal, June 2, 1946.

LANGUAGE. Portuguese belongs to the Hispanic group of the Romance languages. Its alphabet is the same as the English alphabet, though the letters *k*, *v*, and *y* are used only in words borrowed from other languages. Each of the five vowel letters stands for two or more distinct vowel sounds, and numerous diphthongs, and even triphthongs, such as *ei*, *aão*, *o*, *oão*, *oes*, *ões*, occur.

Like Spanish, Portuguese is a direct descendant of the rustic Latin dialects spoken by the legionaries who conquered and held the Iberian peninsula, and in some respects it is nearer to classical Latin than any other of the literary languages of Europe. The Moorish occupation enriched its vocabulary with many Arabic words, but a more important influence was that of the French knights from Burgundy and Provence. By the 16th century Portuguese had become one of the great literary languages of Europe, and the changes it has since undergone are relatively slight. Modern Portuguese is thus far nearer to the speech of Camoens than is modern English to the language of Shakespeare and the Bible.

LITERATURE. For over 1,000 years the written language of Portugal was Latin. A native literature came into existence only after the establishment of the Burgundian dynasty. The French Crusaders brought with them the poems, romances, and chronicles of their own country, thus giving a new literary form to the folk-lyrics and folk-tales indigenous among the Portuguese peasantry.

Court patronage helped the growth of this new literature, especially during the reign of King Diniz or Denis (1279-1325), him-

self a poet of some merit. Historical writings began in the 15th century, during the reigns of King Duarte and Alphonso V. The best prose writers of this period were two court chroniclers, Fernão Lopes and G. E. de Azurara. Romances of chivalry were popular; the first Portuguese edition of the *Palmeirim de Inglaterra* by Francisco de Moraes (c. 1500-72) was published in 1567. Spanish models, in poetry and prose, were closely imitated, and Castilian was long the fashionable language.

Considered as a whole, Portuguese literature is chiefly remarkable for the excellence of its pastoral and lyrical poetry, its histories, and its books of travel. The Renaissance, followed by the discoveries of Prince Henry the Navigator and his successors, afforded new inspiration, and the 16th century is the golden age of Portuguese literature. To it belongs the *Lusiad* of Camoens (1524-80), one of the great epics of all time.

Other great figures of this epoch are the dramatist Gil Vicente (c. 1465-c. 1536), whose work bridges the chasm between the mysteries and moralities of the medieval stage and the true comedy of the 16th century; the poets Bernardim Ribeiro (1482-1552), Sá de Miranda (1485-1558), and Antonio Ferreira (1528-69), and the chroniclers João de Barros (c. 1496-c. 1570), Diogo do Couto (1542-1616), F. L. de Castanheda, and Gaspar Correia. F. Mendes Pinto (c. 1510-83) deserves mention as the author of a fascinating book of travel and adventure in Africa, Arabia, and the Far East.

Exaggerated Classicism

During the 17th and 18th centuries, the ecclesiastical censorship and the decadence of Portugal itself tended to give literature a more artificial character. Originality was replaced by an exaggerated classicism. Historians wrote to order and academies flourished. Nevertheless, two great prose writers, Antonio de Vieira (1608-97) and Marianna Alcoforado (1640-1723), belong to the earlier part of this period, and one distinguished poet, Barbosa du Bocage (1766-1805), to its closing years. Vieira was the prince of Catholic orators in the 17th century. The tragic letters of Marianna Alcoforado have been published in English as *The Love-letters of a Portuguese Nun*.

From the Peninsular War onwards, the more conspicuous literary names in Portugal have been those of poets, journalists, his-

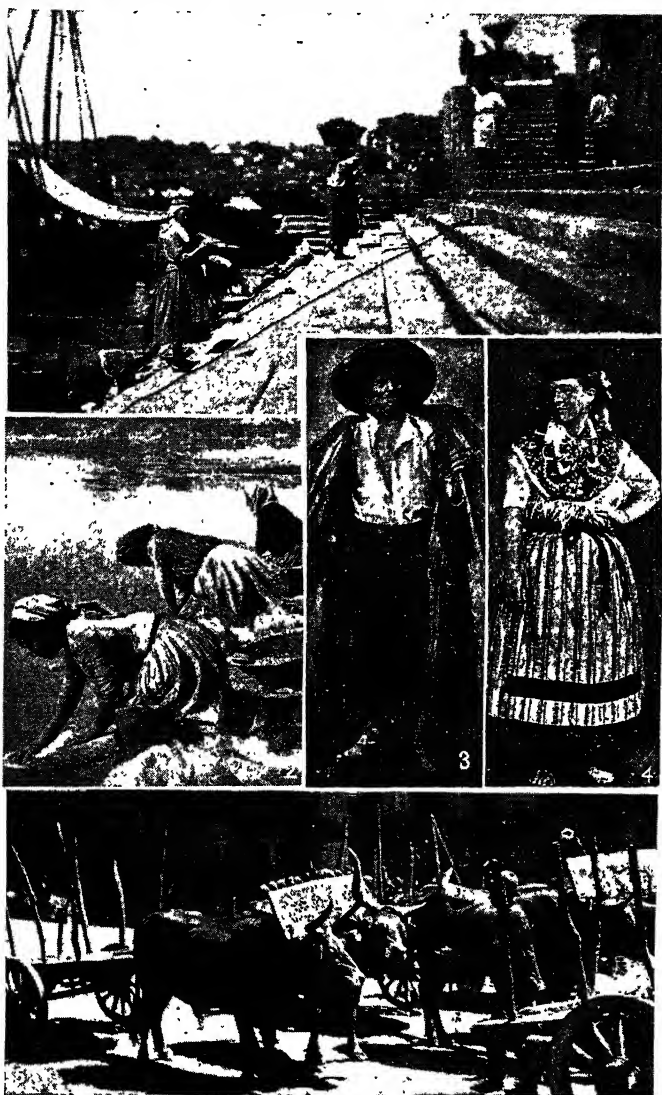
torians, or novelists. The historian Herculano (1810-77) and the dramatist Almeida-Garrett (1799-1854) were instrumental in securing the triumph of the Romantic movement among their countrymen; and Herculano was also a pioneer of historical research. His *History of Portugal* is famous. J. P. Oliveira Martins (1845-94), a later worker in the same field, has been compared with Macaulay; often inaccurate in matter of detail, he wrote brilliantly, and never failed to make the past live. Among the novelists, the best known and most successful have been C. Castello Branco (1825-90), Eça de Queiroz (1843-1900), and Gomes Coelho (1839-71). But the best representatives of the modern Portuguese spirit have been the lyrical poets—João de Deus (1830-96), whose verse has the poignant quality of Heine's songs; Guerra Junqueiro (1850-1923), one of the inspirers of the revolutionary movement of 1910; Antonio Nobre (1867-1900), and others.

The political strife prevailing in Portugal throughout the first quarter of the 20th century hindered literary production. Among the few new writers who emerged were the novelists Raul Brandão (b. 1872) and Aquilino Ribeiro (b. 1885), and the poet Eugénio de Castro (b. 1869).

Bibliography. Portugal, Old and New, O. Crawford, 1880; *History of Portugal*, E. MacMurdo, 1889; *Through Portugal*, M. A. S. Hume, 1907; *Portugal, the Land and the People*, W. H. Koebel, 1909; *Portugal and the Portuguese*, A. F. G. Bell, 1915; *Portugal, Old and Young*, G. Young, 1917; *Portuguese Literature*, A. F. G. Bell, 1922; *They Went to Portugal*, Rose Macaulay, 1946; *History of Portugal*, H. V. Livermore, 1948.

Portuguesa. State of W. central Venezuela. It is situated N. of Zamora, and is named after the river Portuguesa, which traverses the state. Pop. 87,151. The capital is Guanare. The river rises in the Cordillera of Merida, flows S.E. for about 200 m., and unites with the Apure at San Fernando.

Portuguese Man-of-War. Popular name for the genus *Physalia* of the Siphonophora, a group of jelly-fish. In this group the animals occur in stocks or colonies, vitally attached to one another, but not adherent to rocks. Some members are provided with locomotive organs, which they use to draw the rest of the stock after them through the water. In *Physalia* the individual members are attached to a large float filled



Portugal. 1. Women unloading coal on the Ribeira quay, Oporto. 2. Washing clothes in the Minho river. 3. A Carcoia farmer in his straw coat. 4. A Carvalhos peasant girl. 5. Primitive ox-drawn carts still used to convey grapes from the vineyards

with air, which is supposed to bear some resemblance to an ancient man-of-war. The colony is found floating on the surface of the water in the South Seas. The dependent polyps may be divided into three classes. Some, provided with mouths, act as feeders to the colony; others are reproductive; the rest have stings which can paralyse their prey and inflict serious injury on any person who handles them. See *Jelly-fish*, colour plate.

Port-Vendres. Town of France. In the dept. of Pyrénées-Orientales, it contains one of the most commo-

dious harbours of the Mediterranean, defended by forts and batteries. It lies about 20 m. by rly. S.E. of Perpignan, and S.E. again is the lighthouse of Cap Béar. There is a trade in wine. The Roman name was *Portus Veneris*.

Port Way. Traditional name for a Roman road, incorporating an older British track, from Silchester, N. Hants, to Old Sarum, E. Wilts. Traceable through Finkley to the S. of Quarley Hill, it reaches there its greatest deviation of 1 m. from a straight line, 36 m. long, between the terminal towns.

Another road, also called Port Way, runs from Swindon to Wallingford.

Porvoo. Alternative name of the Finnish seaport entered in this work as Borga.

Posadas. City of Argentina and capital of the district of Misiones. Situated on the Alto Paraná, it is on the border of Paraguay and more of its trade is done with that country than with Buenos Aires. It is connected to both the latter and Asunción by rly. and a daily air service. Posadas is the point from which the famous Iguassu Falls can best be visited. Yerba maté and tobacco are grown in the neighbourhood. Pop. est. 38,000.

Poseidon. In Greek mythology, son of Cronos and Rhea, and god of the sea. That domain fell to him when the universe was divided among him and his brothers, Zeus king of heaven and Pluto king of the netherworld. Dissatisfied with this division, Poseidon conspired against Zeus, but was worsted, and as a punishment had to work for a period for Laomedon, king of Troy. He constructed for that king the famous walls of Troy, but when he claimed the reward promised, Laomedon refused to make good his word. Poseidon accordingly sent a sea-monster, which ravaged the country and exacted a tribute of maidens until killed by Hercules (see Hesione).

The palace of Poseidon was supposed to lie at the bottom of the sea. The symbol of his power was a trident, and he was wont to drive over the sea in a chariot with horses having brazen hoofs and golden manes. He had the power of causing not only storms, but also earthquakes. The Isthmian Games were held in his honour. His wife was Amphitrite (q.v.), and the Romans identified him with Neptuneus or Neptune. See Odysseus; Polyphemus.

Posen. This town is described under its Polish name Poznan.

Posilipo. Tufa hill, cape, and village immediately W. of Naples, Italy, and forming a part of that city. The hill is pierced by four tunnels—two ancient and two modern. The earlier ancient tunnel, the Grotto of Posilipo, was pierced in the reign of Augustus; the later, the Grotto of Sejanus, was excavated in A.D. 37 during the reign of Tiberius. In the vineyards near its entrance is a Roman columbarium, the alleged tomb of Virgil. The Grotto Nuova, constructed 1882-85, affords passage to a tram-

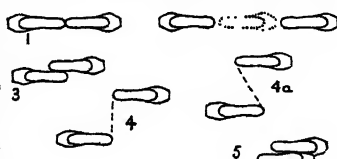
way, and has a lift ascending to the top of the hill, which is covered with villas and vineyards.

Position. Term with several connotations. Musically, as applied to string instruments, it implies shifting the left hand to attain the higher notes. Theoretically the violin has eleven positions, though seven mostly suffice. The hand is said to be in the first position when at the extreme end of the neck of the instrument. The index finger would then be pressed down to obtain the note next above the open string (A on the G string), and the remaining fingers in due order. In the 2nd position the same finger would obtain B, the hand being shifted a little higher, and so on for the other positions, a note higher each time. The same procedure applies to all the strings. The term is similarly applied to the use of the slide in the trombone (q.v.). In harmony, a chord is said to be in the 1st position when the root is in the bass. When the 3rd, 5th, or 7th is in the bass, it is in the 2nd, 3rd, and 4th positions respectively.

In dancing there are five fundamental positions for the feet with corresponding arm movements (see illus.). In ballet there are five basic positions of the feet, from which all movements start and in which all end (see illus.); also five conventional poses for the hands, though these are not standardised, but may be modified at the discretion of the dancer; and five positions for the head.

Position has a number of military connotations: there are the standing, kneeling, and lying positions in musketry; the positions of

foot drill positions of attention and stand-at-ease; arms drill positions of slope, order, and present; positions of files and ranks when a body of men are on parade. On military



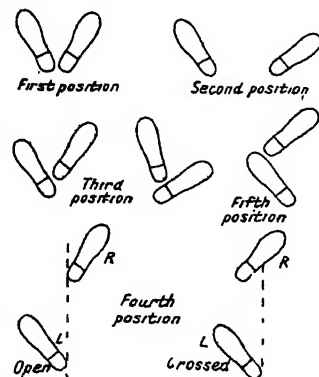
Position. The five basic foot positions in ballet dancing, each of which has corresponding conventional positions for hands and head.

aircraft there are gun positions, or turrets; on large bombers the principal gun positions are nose, waist, upper, and rear; also the pilot, co-pilot, navigator, radio-operator, and bomb-aimer have positions. The word is also used in the military sense for any point held for defensive purposes. In marine navigation a ship has its position relative to a particular latitude and longitude.

Positive. For the use of terms positive and negative in electricity, see Electro-Negative.

Positive. In photography, the record of an object on a film, glass, or paper base, corresponding, as regards light and shade, with the original. Positives may be produced either by exposure of light-sensitive material through a negative (by contact or projection), or by direct reversal of the negative itself during processing. In optics, a positive lens is one which brings light rays to a point (focus) or renders a beam of light more convergent. See Negative; Cinematography; Colour Photography; Lens; Printing.

Positivism (Lat. *positivus*, laid down.) System of philosophy, in particular the system of Auguste Comte. Positivism recognizes only facts or laws established by strictly scientific methods and unaffected by metaphysical or theological considerations. Facts are the phenomena manifested to us by the senses, beyond which nothing exists; laws are the relations of certain facts to other facts. Philosophy investigates the relations of the general laws of each particular science; the object of its search is not the absolute, the causes and principles of things; its only concern is the relative. Regarded as a religious system, positivism is the worship of humanity regarded as a whole and single being. Comte's leading idea was that all intellectual training



Position. The five fundamental foot positions in dancing

the gun crew serving artillery weapons; the high port, *en garde*, and rest positions in bayonet drill;

should be of a synthetic kind, and serve to cultivate the whole character; and in 1851 he published a list of books of permanent value for habitual reading. This list included about 270 distinct compositions by about 140 authors, and was designed to counteract the exclusive spirit of nationality. This list was described and annotated in 1912 in *Among My Books*, by Frederic Harrison, the best-known English positivist. See Comte; Harrison, F.; *consult* What Positivism Means, H. Ellis, 1894.

Positron. Fundamental particle having the same mass as an electron. The charge of positrons, though equal in magnitude, is opposite in sign to that of electrons. They were discovered in cloud-chamber observations on the action of cosmic radiation upon matter.

Posse Comitatus. Latin phrase meaning the power of the county. In early times the sheriffs in the English counties had the power to call out all suitable males, if needed, to quell disorder or pursue felons, and this was the posse comitatus. The establishment of an efficient police in the 19th century rendered this procedure unnecessary, but the power is still retained by the sheriffs by an Act of 1887. See Police.

Possession. In law, having a thing in one's power, or in one's hands. One may possess land, for instance, without occupying it, by having it in the occupation of a tenant. Naked possession, or occupancy, without colour of title or right, is good only to the extent that anyone who seeks to oust the occupier must show that he has a better right. Occupation for 12 years of land, and for 6 years of a chattel, ousts the title of the true owner. See Right of Way.

Possession. Name given to the belief, which has always prevailed in Oriental countries, that evil spirits have the power of entering into and taking possession of the life of any individual. The effect produced by this possession is twofold: (1) physical maladies, especially madness and epilepsy; (2) moral evil, vice, and crime. The belief was very prevalent in the first century of the Christian era, and the N.T. records many miraculous cures of "men possessed by demons."

There has been much discussion in recent times as to whether the belief in demoniac possession is a superstition—the survival of "animism" which is a characteristic of every form of primitive religion—or whether it represents

an objective reality. In view of the light which has been thrown by modern psychology on "dual personality" and "the divided self," the problem cannot be summarily dismissed. If it can be proved that one personality can dominate and control another, the possibility of spirit-possession must be conceded, provided that the existence of evil spirits can be proved. See Demonology.

Posset (origin doubtful, perhaps from Fr. *pusoid*, posset; cf. Welsh *posel*, curdled milk). Beverage made of milk curdled with white wine, ale, lime-juice, or vinegar, and sweetened. It is drunk usually at bed-time as a cure for coughs or colds. The milk is brought to boiling point, and the acidulous liquor added. As treacle is used it is often called treacle-posset.

Possets, PRO DES. Peak of the central Pyrenees, in the prov. of Huesca, Spain. Height 11,046 ft.

Post, WILEY (1900-35). American airman. He came from farming in his native Texas and drilling for oil in Oklahoma to take up flying and parachute jumping in 1924, though he had lost the sight of one eye. He won the Chicago-Los Angeles air race in 1930, and next summer with Harold Gatty flew round the world in 8 days 15 hrs. 51 mins. Post cut this time in July, 1933, to 7 days 13 hrs. 49½ mins. of solo flying. He was killed in a crash in mid-Aug., 1935, while trying to fly across Alaska to Siberia. With him was the film actor Will Rogers.

Postage Stamp. Small paper label, of various face values, sold by the post office to be affixed to letters or parcels sent by post, in proof that the cost of conveyance has been paid. Adhesive postage stamps were invented by J. Chalmers, of Dundee, in 1834, and came into official use in the U.K. in 1841, in succession to the Mulready envelope. The earliest types were printed in solid sheets and had to be cut out for use; perforations were introduced later. Postage stamps vary infinitely in design, colour, and watermark. They frequently bear the effigy of the ruling sovereign, but sometimes depict historical scenes. Special issues for anniversaries, etc., are often of elaborate design, some of the best printing being done in France. Surcharges of all kinds are also used for particular reasons, e.g. when a territory changes hands. See Stamp Collecting.

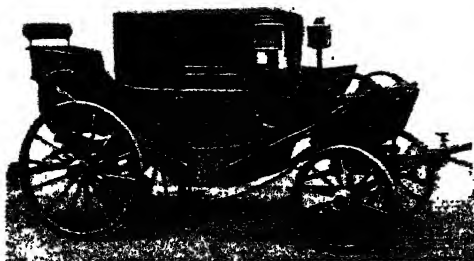
Postal Censorship. This is dealt with under Censorship.

Postal District. Area circumscribed in connexion with the postal service, especially of large cities, to facilitate transmission of letter and parcels. The system of numbered districts has been successfully employed in Berlin, Paris, and other capitals for many years, but in London the postal districts until 1917 were denoted only by certain points of the compass, and the letter C for Central. In 1950 London had 118 numbered districts under the old divisions, e.g. E.C.1, N.W.3 (there is no S. or N.E.), and if these details are given on the envelope the business of sorting is much simplified. The change was made during the First Great War to assist unskilled wartime sorters. Many provincial cities also have numbered or lettered postal districts.

Postal Order. A document issued at post offices for sending money. Postal orders are available in fixed values: in sixpences up to 5s., then 6s., 7s., 7s. 6d., and 8s., and by 1s. steps up to 21s. A poundage of 1d. is charged on orders of 6d. and 1s.; 1½d. on orders from 1s. 6d. to 5s.; 2d. on orders from 6s. to 21s. The value of an order may be increased on orders between two fixed values by affixing postage stamps. Each order has a counterfoil with spaces for the name of the recipient, date of dispatch, and stamp of issuing office. A postal order may be crossed like a cheque for greater security, in which event payment will be made only through a bank. Only the rightful owner may cash a postal order, and he may take legal action to recover its face value from any other person who negotiates it. Orders are valid for six months from the last day of the month of issue.

Postal Union, UNIVERSAL. International organization desiring to facilitate world postal services. Established at Berne, July 1, 1875, after an international convention had met in Paris in 1874, the union is composed of almost all countries of the world, and was founded to reduce the confusion and cost of international postal communication. One of its first acts was to abolish the surcharge levied on mails by intervening countries during transit. The principal benefits effected by the union are the guarantee of rights of transit throughout member countries, compensation for loss in transit, and some uniformity in postal rates.

Postal Union affairs are controlled by a convention which periodically revises its regulations.



Postchaise of English construction, as used in the early 19th century

Normally, congresses are held every five years, e.g. at Stockholm (1924), London (1929), Cairo (1934), Buenos Aires (1939). At this last conference Germany, Italy, Spain, and Hungary refused to sign a new convention because Czecho-Slovakia was included as a signatory state. In 1947 a congress met in Paris to approve a relationship between the Universal Postal Union and the United Nations.

Postcard. Piece of pasteboard used for correspondence through the post office (*q.v.*). In the U.K. postcards were first issued in 1870, with the object of enabling correspondents to transmit a message or greeting in brief form. They were

originally supplied through the post office with a stamp printed thereon and cost $\frac{1}{2}$ d. When printed unofficially and sold at stationers for $\frac{1}{2}$ d., they became highly popular.

Development of the picture postcard was due to the initial popularity of the $\frac{1}{2}$ d. card. British

postal regulations stipulate that no card may exceed $5\frac{1}{2}$ ins. by $4\frac{1}{2}$ ins. or be less than 4 ins. by $2\frac{1}{2}$ ins. Material must be ordinary pasteboard not more flexible than the postcards issued by the post office. Rate of postage was raised from $\frac{1}{2}$ d. to 1d. in 1918, to $1\frac{1}{2}$ d. in 1921, and to 2d. in 1940. A reply-paid postcard, double the length and folded, is authorised for business purposes. See *Picture Postcard*.

Postchaise. A light, closed, four-wheeled vehicle for travellers, said to have been introduced into England from France in 1664. It was hired for the journey, as also were the horses that drew it from one posting-house to the next.

but theatrical announcements may have been chalked on walls or posts. It is said that, in the 17th century, the posts which protected pedestrians in the streets were used for affixing theatrical and other notices: hence the word "poster." Specimens have survived of recruiting posters of the time of Louis XIV, often illustrated by woodcuts, and sometimes coloured by hand. The broadsheets of the same period may be regarded as handbills. Troupes of acrobats made use of both handbills and posters during the early years of the 18th century; the earliest true playbill extant is dated 1737.

First Lithographic Posters

The invention of lithography early in the 19th century made the current type of poster possible, although it was not at first used for this purpose. The French publishers took the lead by producing, for display in booksellers' windows, enlargements of the cover of a book or of one of its more striking illustrations. Most posters of this kind were at first in monochrome, although attempts were made to add colour by means of processes used in production of wallpapers. The honour of introducing the true colour poster is partly French and partly English. Jules Chéret, born in Paris, 1836, served his apprenticeship as a lithographer in England, where machines had lately been introduced making use of large lithographic stones. Chéret launched out as a poster artist in 1866 and, drawing direct on to the stone, produced in his prolific career more than a thousand posters. Some of his best theatrical posters, such as those for the Moulin Rouge and the Folies-Bergère, have become collectors' pieces; they have indeed been surpassed only by his own immediate followers, the greatest of whom was Toulouse-Lautrec. French painting had just reached the point where a certain simplification of outline and flattening of planes were beginning to be accepted as artistically admissible. The discovery of the Japanese colour-print in the middle of the century had had a profound influence on the early Impressionists, in particular upon Manet, and it was his example as a painter that made it easier for lesser artists like Chéret to realize the vivid colour, simplicity of contour, and unity of design without which the poster fails in its appeal.

In spite of all the good work done later the bulk of the

POSTER: PICTORIAL PROPAGANDA

James Laver, Author of *XIX Century French Posters*, etc.

Notes on the ancestry of the poster are here followed by an account of its development in the 19th and 20th centuries, and of notable poster artists. See also Advertising

In one sense the poster is a modern invention; in another it is as old as history. Any pictorial representation publicly displayed has something of the poster in it, especially if its object is propaganda. Those who were responsible for the wall-paintings in ancient Egyptian temples had already mastered the essentials of poster-technique even to the use of firm outlines and flat surfaces of colour. The contemporary poster may claim these paintings among its ancestors. Another ancestor is the public notice, with or without pictorial representation. An Egyptian papyrus has been found dating from about 150 B.C. giving details of two escaped slaves.

The Greeks made use of white-washed walls or wooden boards on which notices could be inscribed. They also painted or engraved inscriptions on the four faces of a kind of rotating square column. Such announcements were often theatrical. The Romans for the same purpose made use of a wall divided by pilasters into panels,

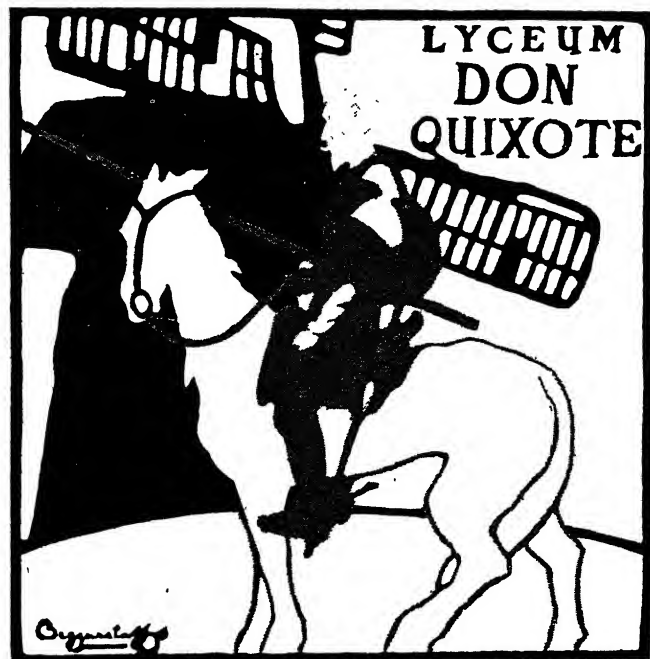
and on these panels they announced in black or red paint the attractions of gladiatorial shows and other amusements. That such announcements were sometimes partly pictorial is proved by the fact that the names of some of the artists have come down to us, e.g. a certain Calludes mentioned by Pliny.

The lettered poster implies the existence of a literate public. This was lacking after the collapse of the Roman empire, and until the end of the Middle Ages publicity was achieved by means of criers. The invention of printing gradually increased the numbers of those who could read and also made it possible to multiply public announcements. Governments, in the early 16th century, were even compelled to make regulations against posters and at the same time they made use of the new invention for their own proclamations. These were sometimes adorned with wood engravings of the royal arms. So far as can be ascertained the theatre in Shakespeare's day did not use posters;

masterpieces of the poster were produced in the first 20 years of the true poster's existence. No one will ever design better posters than Toulouse-Lautrec; and before the 19th century closed France could boast in addition a galaxy of names: Ibels, Anquetin, Gerbault, Bonnard, Valloton, and Steinlen.

In the U.K. poster-art took longer to get into its stride. The famous "Bubbles" advertisement was not designed as a poster; it was a Royal Academy picture by Millais purchased by the proprietors of a brand of soap and reproduced, very skilfully, in colour lithography. This procedure had a double disadvantage: it failed to obtain the simplicity of handling inseparable from the true poster, and it failed to relate the lettering to the design. In a good poster the lettering is always part of the general conception; it is not something stuck on afterwards. One of the best of the early English posters was that designed by Frederick Walker for Wilkie Collins's *The Woman in White*. Technically, however, it was reactionary, for it was produced by woodcut and printed in monochrome. Future development did not lie that way. A more hopeful approach was that of the Beggarstaff Brothers (James Pryde and William Nicholson) who produced their posters for Henry Irving and others by cutting out shapes in different tints of brown paper and mounting them in a series of simple but immensely effective designs. Some excellent examples of their work in this technique are preserved in the Victoria and Albert Museum. The French use of colour lithography was taken up in the U.K. by Dudley Hardy, whose theatrical posters of the 'nineties could hardly be bettered. The melodrama poster of the same period has no claim to any kind of aesthetic value, amusing as some of its products—for e.g. *Uncle Tom's Cabin* and *East Lynne*—may be to the student of manners. The early years of the 20th cent., however, saw many fine artists at work on the poster: e.g. Brangwyn, Hassall, Greiffenhagen, Cecil Alden, Phil May.

The influence of Toulouse-Lautrec and his rivals spread all over Europe. In Germany such masters as Max Klinger and Franz Stuck produced posters and Ludwig Hohlwein devoted himself almost entirely to this branch of art. Austria had Emil Orlik, particularly in the sphere of theatrical publicity; Belgium had Meunier,



Poster by the Beggarstaff Brothers, advertising the production of *Don Quixote* at the Lyceum Theatre, London, in 1895. Original size of poster, 6 ft. square

Cassiers, and Toussaint. In the U.S.A. the pioneers were Louis J. Mead and W. H. Bradley, followed by Maxfield Parrish, James Montgomery Flagg, and C. Dana Gibson.

Those who produced good work later are innumerable. There was a notable decline in theatrical advertising, which dwindled once more to the playbill. Some excellent posters were produced advertising various beverages, and a very real service to poster art was performed by Frank Pick of the old London Passenger Transport Board: among the artists he employed E. McKnight Kauffer (*q.v.*) stands out as a real explorer of new possibilities. But it is doubtful if such a dazzling display of talent as was to be seen on the Paris hoardings in the 1890s will be seen again.

Bibliography. Pictorial Posters, C. Hiatt, 1895; Posters, a Critical Study, C. M. Price, 1913; The Art of the Poster, E. McK. Kauffer, 1924; Studio Special Number: Posters and Publicity, 1926; Commercial Art Annual: Posters and Publicity, 1927.

Poste Restante. French term, also in general use elsewhere, for the department in a post office where letters can be sent to wait until the persons to whom they are addressed call for them. Originally instituted for the convenience of

travellers, the department is not usually available for use by residents in the town itself.

Post-Impressionism. An art movement. The Impressionist theory of division of tone, which was not systematically observed, was restated in 1886 by Seurat and Signac. Chromatic theories were pushed to their limits; pure, separated tints, balanced according to a scientific method, were used to depict some visual impression. But towards the end of the 19th century painters came to depend increasingly on architectural form and perception of formal relations; compositions of the school which succeeded that of the Impressionists were judged aesthetically on the ability of the artist to dispense with representational details and to break away from the camera vision.

Cézanne, the greatest exponent of this style, introduced perspective into his work by means of colour and tone. Van Gogh, Gauguin, and Renoir are sometimes classed as Post-Impressionists, though intense individuality prevented them from adopting wholly the scientific strictness of the method. Picasso and Matisse carried the movement further by combining pieces of wood, sand, and other matter with oils, and using

fragments of actual objects like strips of newsprint or advertisements in their compositions, an innovation adopted by the surrealists.

In England the school was given the name of Post-Impressionism by Roger Fry and Desmond MacCarthy, organizers of the famous exhibition in London in 1910. English exponents included Duncan Grant and Paul Nash. The movement declined with the development of Cubism.

Posting. System of road travel. By it fixed points (posts) were established on the main road, where relays of horses, drivers, etc., were known to be available. The system is of great antiquity, is found in the ancient Roman Empire and in China, and, a government monopoly in many countries, survived in Europe until the development of rly. transport. See Postchaise; Post Office.

Postmark. An official mark stamped upon the envelopes of letters, postcards, and packages



Postmarks. Postmarks of 1680, the first to be used. Lambeth receiving office stamp, centre, and two others showing times of receipt

passing through the post. The first was introduced by William Dockwra, a London merchant who in 1680 established a penny postal system in London and stamped all packages passing through his receiving offices with the date and name of the office. When this lapsed, postmarks were not again used until 1840, when Rowland Hill's penny post was established. Primarily they consisted of a coloured cross or other mark for cancelling the adhesive stamp, but later had names and dates to indicate where and when the package was posted. In the First Great War the practice arose of including in the postmark slogans and exhortations, e.g. advertisements for war loans. Postmarks have encouraged such campaigns as fuel saving, safety first, salvage collection, national savings, etc. A postmark incorporating victory bells celebrated the end of the Second Great War. Franking machines used by industrial concerns for stamping their correspondence incorporate a postmark and, if desired, an appropriate phrase; all phrases must have post office sanction, and no political propaganda is permitted.

Postmaster-General. In the U.K., member of the government in control of all departments of the post office, and, as such, responsible to parliament for policy and efficient administration. The office dates from 1710, when a general post office for the whole of the British dominions was set up in London. The postmaster-general is sometimes a member of the cabinet. Subject to certain exceptions, he possesses, by virtue of various Post Office Acts, exclusive privilege of carrying letters from place to place, and of performing all incidental services such as collecting and delivering. He is the minister responsible to parliament for the activities of the B.B.C. See Post Office.

POST OFFICE: HISTORY AND WORK

The origins of the post office are here traced from the time of the Roman empire. See also articles on Air Mail; Money Order; Postal Order; Telegraph; Telephone, etc., and on Rowland Hill, pioneer of the British penny post

The word post (Lat. *positus*, placed or stationed) is a reminder that the Roman empire, like the Persian before it, had to establish a network of couriers posted or stationed at suitable places, so that they could receive dispatches from or to the imperial centre and convey them with all speed to the next post towards their destination. Some means of rapid communication is essential to the government of a large territory; and most medieval rulers found it necessary to expend large sums to maintain couriers and posts at which they could be furnished with fresh horses, lodging, etc., or even hand over their letters to other couriers. Usually a master of the posts was appointed to superintend the arrangements. In due course merchants and other private individuals were encouraged to utilise such postal facilities; and eventually the postal service came to be regarded as a source of revenue, and reserved as a monopoly of the state authority. Often, for convenience, it was farmed out to enterprising speculators, who guaranteed to pay a stated sum to the ruler each year, recouped themselves when and how they could, and prevented anyone else from poaching on their preserve.

Thus, the state postal service was established in France in 1464; but from 1672 until the revolution it was farmed out. Napoleon remodelled it on its present lines. The Italian postal service originated in the state couriers established by the Venetian republic in

Post Mortem (Lat., after death). Term commonly used for a post mortem examination, i.e. the examination or dissection of a body after death, usually in order to discover or verify the cause of death. See Autopsy; Coroner.

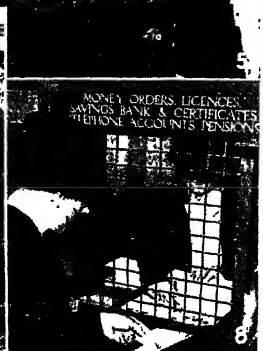
Post-obit Bond (Lat. *post*, after; *obitus*, death). Bond, or written obligation, to pay a sum of money after the death of a certain person. As a rule, such bonds are given by expectant heirs. They were formerly a favourite form of usurer's security; but they are hazardous, as a court will set such a bond aside if given by an expectant heir, unless the person in whose favour it is drawn can show that he paid a fair price for it, having regard to the risk.

the early 16th century. Somewhat larger continental cities, such as Strasbourg and Nuremberg, organized their own messenger service.

In the U.K. private letters were conveyed for centuries by common carriers or by personal servants. In the reign of Edward II the system of post-houses that had been established to provide the king's messengers with a change of horses was extended to private couriers. In 1548 a statute fixed a charge of a penny a mile as the maximum rate for the hire of post horses. A chief postmaster of England was appointed under Henry VIII, and under Elizabeth the transmission of letters to the Continent was organized.

A State Monopoly

In 1635 the first inland post for public use was proclaimed, a service of messengers conveying letters along eight routes at a minimum charge of 2d. Shortly afterwards the carrying of letters along those routes by private messengers was forbidden. The state monopoly thus established has been upheld by parliament, notwithstanding several attempts during the 17th century to break it. Thus, in 1649 the common council of London set up a local service; this was promptly suppressed by the house of commons. Only one enterprise partially succeeded: the metropolitan penny post, instituted in 1680 by William Dockwra, who actually carried and insured letters and parcels up to £10 in value and 1 lb. in weight for a penny each. After much litiga-



1. Sorting of packages, Birmingham head office. 2. Primary sorting, Chester sorting office. 3. Stamping machine, Croydon sorting office. 4. Loading container from conveyor, London post-office rly. 5. Loading a plane with air mail, London airport. 6. Interior of a post office rly. coach. 7. Device for mail-bag delivery from rly. post-office. 8. How the public services of the G.P.O. extend far beyond the conveying of letters

POST OFFICE: SOME OF THE ACTIVITIES OF THE BRITISH POSTAL SERVICE

tion, his service was incorporated as part of the General Post Office, he himself being appointed as controller of the London office. Even officially appointed postmasters could make fortunes out of improving the postal service, a striking instance being the half million made by Ralph Allen (*q.v.*).

Postal arrangements were much improved in 1784 when royal mail coaches, escorted by armed guards, replaced postboys, and the guard was made responsible for loss of time en route. The average speed was increased from six to 10 m. per hr. In 1836 the distance from London to York, 197 m., was covered in the scheduled time of 20 hrs. But the rly. era had begun. In 1830 the first dispatch of mail by train took place (Liverpool to Manchester); and soon the mail coach was running on rails.

UNIFORM PENNY POST. The greatest revolution in the postal service, however, is associated with Rowland Hill. In a pamphlet, *Post Office Reform*, he advocated in 1837 the establishment of a uniform penny post throughout the kingdom, to replace the system of charging according to the distance a letter had to be taken. At that time the minimum charge for a letter was 4d.; the average charge, 7d.; and the cost between London and Edinburgh, 1s. 3½d. Hill argued that the real cost need be only a small fraction of a penny, that the current rates were prohibitive, that if a standard charge of 1d. throughout the kingdom were imposed the volume of correspondence would so increase that the service would more than pay its way, and the social value would be very great. Although the scheme was opposed and ridiculed, a committee of inquiry was set up, and in 1839 an Act was passed enabling the Treasury to establish a uniform penny rate for the whole of the U.K. Prepayment by means of postage stamps—another great invention—replaced the cumbrous system of collecting dues on delivery. As a result of the new plan the number of postal packets carried increased within 25 years from 5 per person to 42. In 1946 the number of postal packets was nearly 7,000 millions, or more than 140 per person. Imperial penny postage was instituted in 1898, and the penny post between the U.K. and the U.S.A. in 1908. The minimum penny charge for a letter within the U.K. remained in force until 1918; while a uniform charge irrespective of distance within a territory is almost universal.

The registration of packages containing valuables dates from 1792. In that year a system of money-letters, that is, letters of advice, was tentatively introduced as a means of avoiding the risk of sending money through the post. In 1838 the dept. officially adopted the plan, calling the letters money-orders, and extending the arrangement to other countries. This method of payment was of great service before the extensive network of branch banks and the method of paying by cheque had been developed. In 1881 the issue of postal orders for small fixed amounts began. The parcel post service was introduced in 1883; it has become almost world-wide. The Post Office savings bank was established in 1861 to encourage thrift. On Dec. 31, 1946, the bank had 24,000,000 active depositors with a total balance of nearly £2,000 million.

TELECOMMUNICATIONS. The scope of British post office activities was transformed by the discoveries and inventions connected with telegraphy, telephony, and wireless telegraph transmission. At first the transmission of telegrams was controlled by private companies; but parliament in 1868 empowered the postmaster-general to maintain electric telegraphs, and two years later gave him exclusive rights in the dispatch of telegraphic messages within the U.K. Bell's telephone instrument, invented in 1876, formed the basis of several systems evolved by rival companies, whose interests were ultimately united in the National Telephone co., whose system was transferred to the G.P.O. in 1912. The wireless stations on the coast of the U.K., with certain exceptions, were acquired by the G.P.O. during 1909-10; and in 1946 Cable and Wireless Ltd., with its world-wide network of transmitting and receiving stations, was purchased by the govt. to be operated in close association with the G.P.O. Broadcasting was similarly closely linked with the Post Office in its earliest days, and the postmaster-general remains the minister responsible for it to parliament.

SAVINGS, PENSIONS, LICENCES. The G.P.O. is the govt. agent for the sale of national savings certificates and annuities, the payment of war pensions, old age pensions, retirement pensions, and family allowances, the issue of dog, motor vehicle renewal, game, wireless receiving, etc., licences, and the distribution of many kinds of official forms, particularly forms

of application for licences. The Post Office Guide, obtainable at any post office, explains the full scope of the many services carried out through post offices.

In 1946 the G.P.O. dealt with 6,230 million letters, etc.; 257 million parcels; 339 million air-mail items; it sold 22 million money orders, and 213 million postal orders; it transmitted 75 million telegrams and handled 2,368 million telephone calls, of which 193 million were trunk calls. It issued 10.4 million wireless licences. The total transactions with the public exceeded in value £3,000 million. On Jan. 1, 1947, the G.P.O. had 351,000 employees; and owned 24,000 post offices, 5,800 telephone exchanges, 52,000 telephone call offices, 1,800,000 m. of overhead telegraph wires, 21,900,000 m. of underground cable, and 42,700 m. of submarine cable. There were more than 4,000,000 telephone subscribers.

So immense an undertaking is necessarily highly departmentalised and decentralised. Management is vested in the Post Office board, the chairman of which is the postmaster-general. He is the minister responsible to parliament for the dept., is a member of the govt., and changes with it. His powers are defined by a long series of statutes. The h.q. of the G.P.O. is at St. Martin's-le-Grand, London, E.C.4. The following are the chief depts.: personnel; postal services; telecommunications; accountant-general; contracts; engineering; factories; public relations; savings; solicitor's; stores; secretary's. London has two regional directors, one for postal and the other for telecommunications work. Outside the London area regional directors are in charge of all post office services and undertakings.

SECOND GREAT WAR. The work of the G.P.O. extended to every front and included work in association with all the services at home and abroad. It was an essential link in organizing and controlling the movement of vast forces on land and at sea, and in maintaining supplies to them and to the people at home. Its postal service sustained morale. Its telephone and telegraph services, and the efficiency with which these were maintained despite bomb damage and dangers were one of the foundations of home defence. For example, the central telegraph office in King Edward Street, E.C.1, was destroyed in the great fire raid of Dec. 29, 1940; the service was

fully restored in less than three weeks in alternative accommodation. Casualties were heavy in personnel and in material. But the powers of improvisation and the courage of Post Office workers seemed inexhaustible, and interruptions to essential services were short, even after the heaviest raids.

Bibliography. Life of Sir Rowland Hill and History of Penny Postage, Sir R. and G. B. Hill, 1880; The Royal Mail, J. W. Hyde, 1880; History of the British Post Office, H. Joyce, 1893; History of the British Post Office, J. C. Hemmison, 1912; The Post Office Went to War, Ian Hay, 1946; Post Office Guide, Nov., 1946, edition and supplements.

Post Office Savings Bank. Institution set up, primarily for small savings, by the post office under an Act of 1861. Each depositor is provided with a pass book, and sums may be paid in, or withdrawn, at any post office transacting savings bank business. Warrants can be issued on the accounts; deposits are limited to £500 by an individual in any year. The bank provides facilities for investment in and the sale of government stocks and has a department dealing with national savings certificates.

Postulate (Lat. *postulatum*, something demanded). In scientific language, the demand that the truth of a principle which has not been, or cannot be, proved should be taken for granted: e.g. in geometry, the claim for the admission of the assumption that a straight line can be drawn between any two points, or that two straight lines cannot enclose a space.

Post-war Credit. Sum representing additional income tax paid by a British taxpayer during each of the years between April, 1941, and April, 1946, as a result of reductions in earned income and personal allowances made by the Finance Act, 1941; except that those who came under the pay-as-you-earn system in April, 1944, received no post-war credit for 1943-44 as part of the tax due during it was discharged. The sum was placed to the credit of the taxpayer for repayment "so soon as may be" after the end of the war. For each year in respect of which additional tax was paid, a certificate was issued. Repayment began in 1946 to women over 60 and men over 65 years old. The credits totalled about £800 millions.

Potamogetonaceae. Botanical name for the pond-weed family. In current botanical systems it is in the family Naiadaceae (*q.v.*).

Potash. Name given to various chemical combinations of potas-

sium (*q.v.*). Potassium salts is used in the same sense. Potash manures are manures originally obtained from plant ashes, but now mostly derived from natural deposits. The chief forms are muriate or chloride of potash, sulphate of potash, and kainite, which is a mixture of sulphate and chlorides of potash with other salts. *See* Manures.

Potassium. One of the metallic elements. Its chemical symbol is K (Arabic, *Kali*); atomic number 19, which makes it a neighbour of sodium in the periodic table; atomic weight, 39.096; specific gravity, 0.87; melting point, 62°C (143.6°F.). Its colour is silver-white with a touch of violet and a brilliant metallic lustre. At normal temperatures it is soft and malleable, easily cut with a knife or moulded into any form. At 0°C. it is brittle and crystalline; while at a red heat it volatilises in a green vapour. Being lighter than water it will float, but instantly decomposes the water with which it is in contact by reason of its great affinity for oxygen. A freshly cut surface is immediately covered with a film of oxide. It is therefore necessary to keep the metal under naphtha or rock oil; though even so protected it will tarnish in time, and the only way of preserving its brilliant lustre indefinitely is to seal it in a high vacuum tube. It is the metallic base of potash (*q.v.*).

Potassium was first isolated by Davy in 1807. Mankind had long been familiar with the carbonates of potassium and sodium, but had regarded them as identical. They were called fixed alkali by the Arabian alchemist Geber to distinguish them from ammonium carbonate, which he called volatile alkali; not till 1736 did the French chemist Duhamel show that the alkali of common salt was a different thing from that of wood ashes, potash, and thereafter the latter was considered and described as vegetable alkali and soda as mineral alkali.

Later the Austrian Klaproth showed that the so-called vegetable alkali was found in various mineral substances, and the term potash was given to this alkali, and natron or soda to the mineral or common salt alkali. Both substances, however, continued to be regarded as elements until Davy's discovery, though Lavoisier had suspected their compound character. Davy obtained the metal by passing an electric current through a slightly moistened piece of caustic potash contained in a platinum dish; the metal appearing at the negative

pole, while oxygen was evolved at the positive.

Potassium does not occur native in the crust of the earth, but it is widely distributed, being found in combination with aluminium and silica. With these it forms such minerals as potash feldspar and muscovite mica. It is easily leached out of the feldspar during erosion and is taken in solution into the sea. Under favourable conditions the evaporation of brine has at various geological times given rise to thick beds of the potassium salts found in sea-water (sylvite, carnallite, and kainite). The most important deposit is at Stassfurt, Germany. Natural brines are located in the Dead Sea and in California. In the nitrate deposits of Chile the most important salt is that of sodium, but potassium nitrate (saltpetre) is also present. Other minor sources of potassium are the minerals alunite, leucite, and glauconite, of which deposits occur in Germany, France, Poland, and the U.S.A.

Potassium was once obtained by reduction of the carbonate with carbon and subsequent distillation of the metal, until Castner devised a process which involved heating potassium hydroxide with an iron carbide. The mixture was heated in retorts and the metal again distilled off and condensed into a mineral oil. Modern production is almost entirely by an adaptation of Davy's original process, the electrolysis of fused potassium hydroxide; this was also devised by Castner and is exactly analogous to the method of producing sodium (*q.v.*). Caustic potash is held in an iron pot and maintained in the molten condition by a ring of gas flames. The anode of the electrolytic cell is either iron or nickel, and the molten potassium formed at the cathode floats to the surface and is periodically removed with a ladle. In a recent process a fused mixture of potassium and calcium chlorides is electrolysed. Potassium has been used, like sodium, as a hardener for lead.

Potassium Salts. Caustic potash, or potassium hydroxide, may be made by the interaction of potassium carbonate and milk of lime, the clear solution which results being evaporated in a silver vessel until all the water is driven off. The caustic potash, still liquid, is poured into moulds to form, when cold, white sticks, which are characterised by their deliquescent properties. Potassium hydroxide is now manufactured by the electrolysis of potassium chloride

solution. The name caustic potash is derived from the fact that this substance rapidly destroys both animal and vegetable substances with which it is brought into contact. It is used to make soft soap. Potassium bromide, needed in medicine, is made by decomposing bromide of iron by potassium carbonate, the iodide of potassium, another medicinal salt, being prepared in a similar manner. Potassium chlorate is an oxidising agent in industrial chemistry, e.g. the manufacture of matches and fireworks, and in calico-printing. The method of making it is described in the article Chlorates. Potassium silicate is dealt with in the article Waterglass.

Potassium cyanide, when pure, is a white crystalline substance, which will melt without decomposing; it is often sold fused with the carbonate as "cake," the percentage figure given, from 30 to 95, indicating the amount of pure cyanide. It is soluble in water, and is a compound of potassium with cyanogen according to the chemical formula 4KCN . It is most con-

veniently prepared from common yellow prussiate of potash by heating with potassium carbonate. Potassium cyanide has long been known as a solvent of gold and other metals, and is still largely used in the art of electro-plating. The successful application in 1889-90 of the MacArthur-Forrest process of extracting gold from its ores by a weak solution of potassium cyanide led to an immensely increased demand for this chemical; production increased from under 100 tons per annum to over 6,000 tons in a few years. The substance is being superseded in the gold industry by the cheaper sodium cyanide. It is a powerful poison.

The various salts of potassium have uses in photography, e.g. the hydroxide and carbonate as accelerators in developers; bromide as a restrainer, metabisulphite as the acid constituent of fixing baths; ferriocyanide as a bleacher and reducer; iodide for the compounding of intensifiers and reducers; cyanide as a reducer and solvent of silver salts; biochromate as a bleach and a sensitiser for gum. See Carnallite; Cyanide Process; Nitrate; Saltpetre.

Potato (*Solanum tuberosum*). Tuberous rooted plant, normally grown as an annual. In its natural state it is a perennial, renewing itself by means of underground stem tubers. It belongs to the family Solanaceae. Potatoes are natives of the W. regions of N. and S. America, the greatest diversity of species occurring in Chile. From these regions they were introduced by the Spaniards into Europe in the latter half of the 16th century. The best quality of table potatoes are obtained from silt, warp, or limestone soils, and the poorest quality from peat soils, but, provided the land

is well drained, potatoes can be grown profitably on all soils except heavy clays.

Cultivation before planting should be directed to providing a loose, open condition of the soil to a depth of 6-8 ins.; after planting it should aim at keeping down weeds and earthing-up

the young tubers to prevent "greening," and to protect them from blight. The crop requires liberal manuring; 10-15 tons of farmyard manure with 5-10 cwt. of artificial to the acre is a normal dressing, although much heavier dressings are applied.

Potatoes should always be grown in rotation with other crops whether they are produced on a field or a garden scale; they should not occur on the same land more often than once in three or, preferably, five years.

In the U.K. seed (i.e. tubers) is planted from Feb. to May, depending on the district and the variety. The tubers, which are often "chitted" (i.e. have been allowed to sprout), are planted 4 ins. deep and 12 ins. to 18 ins. apart in the drills. Fifteen to twenty cwt. of seed is required to plant one acre, the quantity depending on the variety and size of seed, width of the drills, and the distance apart.

In garden culture the crop is lifted with a fork or gripe. A large-scale crop is ploughed out or raised with special implements and gathered by hand. When there is blight on the foliage, unless the produce is for immediate use, the tops should be cut and destroyed before the potatoes are lifted.

Potatoes are normally stored in a pit or clamp, covered with wheat or rye straw, and after 14 days or so, to allow for sweating, earthed over to a depth of 6 ins., holes being left along the clamp ridge for ventilation. Sods of peat 2 ins. thick can be used instead of straw.

Varieties of Potato

Varieties of potato are generally grouped according to their period of maturity, and their immunity or susceptibility to wart disease. Varieties of 1st early, 2nd early, main crop, and late main crop which are immune to wart disease are available; detailed information on varieties can be obtained from the National Institute of Agricultural Botany, Cambridge, or from the local agricultural organizers.

Potatoes are subject to many pests and diseases, most serious of which are root-eelworm, wart disease, blight, and a number of maladies caused by viruses. The chief causes of attack by root eelworm, a minute parasite worm, are cultivation of potatoes too frequently on the same land, and the use of seed carrying eelworm cysts or eggs in the soil attached to the tubers. Wart disease is caused by a primitive slime fungus. Blight (*Phytophthora infestans*) attacks



Potato. 1. Under side, and 2. upper side of affected potato leaf illustrated in healthy condition in 3. 4. Diseased tuber. 5. Highly magnified portion of under surface of diseased potato leaf: A, stomata or pores through which protrude filaments, B, of *Phytophthora*, bearing sporangia, C. 6. Highly magnified portion of diseased leaf, lettered similarly to 5, showing *Phytophthora* in tissues of leaf. 7. Tuber affected with *Spongosporium* scabies

both the leaves and the tubers. Varieties differ in susceptibility, but in districts liable to attack the crop should be sprayed with Burgundy or Bordeaux mixture as a prophylactic. Virus diseases, the effect of which is a progressive reduction of yield, are perpetuated through the tubers. They are spread from infected to healthy plants by green fly. As green fly do not thrive in wet and windswept areas, seed from Scotland, Northern Ireland, Eire, and high lying areas in Wales and England, is noted for its freedom from various diseases. See Colorado Beetle.

Potato Marketing Board.

Organization of the potato producers in England and Wales set up in Dec., 1933, at the request of the National Farmers' Union to administer the bulk purchase and distribution of potatoes. The board has statutory powers under the Agricultural Marketing Acts, 1931-33. No non-member may grow or sell potatoes; all imported potatoes are purchased and distributed by the board. It determines from time to time the minimum size of potatoes that may be sold; and in normal times, to adjust supply to demand, each producer is allotted a basic acreage and forbidden to plant in excess of his allotment. The board has h.q. at Oxford.

Potato Spirit. Ethyl alcohol made from potatoes. These are heated by steam to a temperature of 140-150° C., under a pressure of from two to three atmospheres. The mass is then removed and mashed with malt at a temperature of 57-60° C., during which process the starch of the potatoes is converted into sugar. The mash is then fermented with yeast to form ethyl alcohol, which is separated by distillation. See Distilling.

Potchefstroom. Oldest town of the Transvaal, S. Africa. It stands on the Mooi river, at an elevation of 4,000 ft., 88 m. by rly. S.W. from Johannesburg, and has an aerodrome. The buildings include a university college and an agricultural college, connected with an experimental farm. The centre of a fine agricultural country, with gold mines in the neighbourhood, Potchefstroom has a large park, fine golf links, and a lake formed from the river. It was founded by a band of wandering Boers under Potgieter in 1838, and was for some time before 1863 the capital of the little Boer republic. In 1862, during the civil war, it surrendered to



Potchefstroom, South Africa. General view of the oldest town in the Transvaal

Kruger after a comparatively harmless bombardment. In the war of 1880-81, a small British force surrendered here to the Boers after a stubborn defence. On June 11, 1900, Colonel B. T. Mahon entered the town without opposition from the Boers. Pop. est. 25,000.

Poteen or **POTHEEN** (Irish *poitin*, little pot). Whisky illicitly distilled by Irish peasantry. The making of poteen arose at the end of the 18th century owing to the government's refusal to license small stills in Ireland; and smuggling became so general that in 1815, to discourage illicit distilleries, licences were granted to stills of only 40 gallons' content. Poteen is still occasionally made in remote parts. See Pot Still.

Potemkin, GREGORY ALEXANDROVITCH, PRINCE (1739-91). Russian statesman. He was born Sept.



Prince Potemkin, Russian statesman

27, 1739, near Smolensk, of an ancient Polish family. One of the conspirators who dethroned Peter III in favour of Catherine II, he early attracted the notice of the empress, and in 1762 became a gentleman of the bedchamber. In the war against Turkey, 1771, he was made a lieutenant-gen. He was responsible for the partition of Poland, 1772, and the conquest of the Crimea, 1783, which was accompanied by the wholesale butchery of some 30,000 Tartars. In 1787 he declared war against Turkey, and as commander of the army took Ochakov, Dec. 17, 1788. He died near Jassy, Oct. 15, 1791. Potemkin owed much of his influence with Catherine to his handsome appearance, which earned him the epithet of the Russian Alcibiades. His Memoirs were trans. from the German, 1812.

Potential. Broadly, a term meaning power to do work. Whatever form a particular technical definition of potential may take, it will always include this sense. A steam boiler under pressure, an elevated body of water, a cylinder of compressed gas or air, all have potential, i.e. power to do work, whenever the necessary conditions are satisfied. The essential factor of these conditions is always a difference between the initial and final states, e.g. a difference of pressure. Two steam boilers, both at the same pressure, have no potential with regard to one another; neither can do any work against the other; but when either is connected to a condenser, or opened up to the atmosphere through a steam engine, it can do work by virtue of the difference of pressures which thus arises. Its potential is measured by these differences of pressure.

In electricity, the term is used for the work done in charging a body with a positive charge brought up from an infinite distance, or taken from a body in which the electrical potential is zero. The earth itself is regarded as being on the whole at zero potential, for its capacity is so large that the addition of any ordinary sized charges will make no difference to its potential. In measuring electric potential earth potential is the standard of reference.

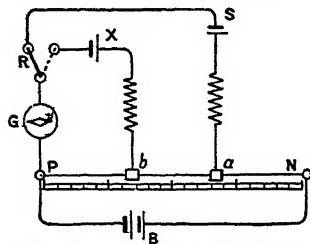
Electrical potential difference (P.D.) is measured in volts. Thus, when it is said that the voltage of an incandescent electric lamp is 100, it is meant that a potential difference of 100 volts is required to force through the lamp the necessary quantity of electricity to raise the filament to the temp. needed in order that it may give out its proper measure of light. (See Electricity; Units, Electrical.)

Gravitational potential, or geopotential, at any point above the earth's surface is the potential energy of a unit quantity of

material placed there. In meteorology, potential temperature is that which a sample of air would acquire if brought to a standard pressure (usually 1,000 mb.) under adiabatic conditions, i.e. conditions in which the sample of air would neither receive heat from nor give heat to its environment.

Potential Barrier. Term used in wave-mechanics. A positively charged particle on approaching the nucleus of an atom will suffer repulsion down to distances of the order of 10^{-11} cm., but at smaller distances from the nucleus attractive forces must operate—otherwise it would fly to pieces. The nucleus is considered therefore to be surrounded by a so-called potential barrier, which means that the bombarding particle has to possess sufficient energy to overcome this barrier before it can enter the nucleus. On wave-mechanical theory it is possible for some lower energy particles to "seep" through the barrier.

Potentiometer. In electricity, an instrument for measuring or comparing the electromotive force



Potentiometer. Diagram illustrating principles of the instrument. See text

(E.M.F.) of a cell, or potential difference (P.D.) across a resistance, due to the passage of an electric current.

The principle is explained by the diagram, in which X is the cell under test, S a standard Clark or Weston cell, B a battery of greater E.M.F. than either X or S, and N P a wire of high resistance with sliders *a*, *b*. The cell positive terminals are all connected with P (those of S and X alternatively through switch R). Galvanometer G is interposed between R and P. First, assume S to be connected to slider *a* on P N, and with P through R. Current from B will flow from P to N, and, encountering resistance in P N, will tend to divide and shunt part of itself through G and S to *a*. At the same time S tends to send current in the opposite direction, namely, from S to P. Galvanometer G is deflected in one direction or the other, according

as the E.M.F. of B or S predominates. By sliding *a* along the wire the two currents may be brought into equilibrium, as will be shown by G not being deflected. Cell X is then balanced in like manner against B by slider *b*, and

$$\frac{\text{E.M.F. of X}}{\text{E.M.F. of S}} = \frac{Pb}{Pa}$$

The E.M.F. of S is known; therefore that of X can be calculated. Since at balance no current flows through X and S the series resistance included with each will not affect the balance-point.

Potenza. Province of S. Italy. With the prov. of Matera it forms the region of Lucania, and is bounded N. by Foggia, E. by Matera, S. by Cosenza, and W. by Salerno and Avellino. The province has a seaboard on the Gulf of Policastro on the W. The land slopes gently from the Apennines on the W., and is well watered. The chief products are cereals, wine, and oil. This province saw heavy fighting between Allies and Germans in 1943. Pop. 430,000.

Potenza. City of Italy, capital of the prov. of Potenza. It is picturesquely placed on the E. declivity of the Apennines, near the source of the river Basiento, 103 m. E. by S. of Naples. Surrounded by medieval walls and fortifications at an alt. of 2,700 ft., it has one of the coolest climates in Italy. The city was almost destroyed by an earthquake in 1857. During the Second Great War the fine cathedral, in the Doric style, was hit by an aerial bomb and suffered in the fire which followed; the prov. museum of Lucania was damaged beyond repair, but the more important objects were stored in safety. It was taken from the Germans by a Canadian armoured formation on Sept. 21, 1943. The old Roman town of Potentia lay some 465 ft. lower down the mountain side. Pop. 25,103.

Pot Hole. Hollow in a river bed which is deepened by the gyration of accumulated stones by the current. In soft rock these holes often attain considerable size. In limestone regions solution rather than mechanical action produces pot holes along vertical or steep planes of weakness in the

rock. These may unite with cave systems dissolved out along planes of stratification. Such limestone pot holes become shafts or swallow holes, down which rivers disappear. The exploration of the larger holes, known as pot-holing, has its attractions for the adventurous. See Gaping Ghyll; Giant's Kettle; Karst; Speleology.

Poti. Seaport of Georgia S.S.R. It is 60 m. W. of Kutais, stands in a marshy district where the Rion falls into the Black Sea, and is a junction on the Transcaucasian rly. Its exports are manganese, maize, and wheat. Poti was ceded by Turkey to Russia in 1829. It is the ancient Phasis.

Potidaea. Town in Chalcidicē, ancient Macedonia. Although a Corinthian colony, it was a member of the Athenian confederacy, and its revolt in 432 B.C. was one of the causes of the Peloponnesian War. After a two years' siege, it was taken by the Athenians. In 356 it was destroyed by Philip of Macedonia.

Potiphar. Biblical character. An Egyptian, he was captain of Pharaoh's guard and purchaser of Joseph, against whom Potiphar's wife brought a false charge after trying without success to seduce him. There is little historical evidence for the story, which is told in Gen. 39.

Potlatch (Chinook, from the Nootka *patshath*, a giving). Social custom prevalent among the American Indians on the N. Pacific coast. It consists in a ceremonial giving of presents, the acceptance and repayment of which with interest are compulsory.

Pot Metal. Name of glass that has been coloured by additions of metallic oxides. The glass is coloured in the melting-pot with the oxides, in contradistinction to that which has been only superficially coloured. See Stained Glass.



Pot Hole. Two pot holes, from above, one filled with water, the other showing the stones which formed it

Potomac. River of the U.S.A. It is formed by the junction of two branches, which rise in the N. of West Virginia, and unite about 14 m. below Cumberland in Maryland. The main river follows a general S.E. course of 365 m. and enters Chesapeake Bay by an estuary from 2 m. to 7 m. broad, and nearly 80 m. long. It forms a cataract about 35 ft. high, 15 m. above Washington, at which it becomes navigable. The Shenandoah is its largest tributary. There was much fighting around the river during the American Civil War (*q.v.*).

Potometer. Apparatus used in plant physiology for measuring the rate of absorption of water by plant organs. Since under normal conditions a healthy plant loses by transpiration approximately the same amount of water as it absorbs, the rate of transpiration may be studied. Most potometers consist of a vessel filled with water and having three apertures. In one, the lower end of a shoot cut from a plant is fixed by a perforated cork in an airtight manner so that its cut end dips into the water in the apparatus. In the other two apertures are fixed a funnel with a stop cock in its stem, and a length of capillary tube. At the start of an experiment the whole apparatus must be full of water and the stop cock closed. As the shoot transpires it absorbs water out of the apparatus, and the column of that liquid in the capillary is drawn inwards. The rate of movement of the end of this column gives a measure of the rate of transpiration.

Potosí OR CERRO RICO DE POROSÍ. Mountain, dept., and town of Bolivia. The mt. rears to an alt. of 15,500 ft., is snow-capped, and is the site of one of the richest silver mines known, which was ex-

ploited by the Spaniards in the 16th century. The Cerro is 18 m. in circumference, and the borings and shafts made in the mt. sides in search of silver exceed 5,000. It is estimated that the total yield of silver has exceeded in value £500,000,000. The dept. occupies the S.W. of the country and adjoins Chile on the W. and Argentina on the S. It is crossed in the middle by the Cordillera de los Frailes, E. of which the dist. drains to the Pilcomayo; in the W. is the extensive Salar de Uyuni. The surface is generally mountainous, but it contains the wide salt swamp known as Salinas Grandes. Potosí yields gold, silver, copper, bismuth, and tin. Its area is 45,867 sq. m. Pop. est. 754,600.

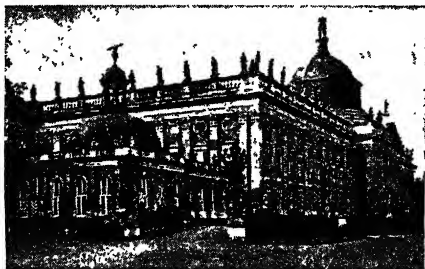
The town of Potosí, one of the highest inhabited places in the world, stands at 13,600 ft. alt. on the side of the mt.; much of it is in ruins, having been in part deserted. It contains the government mint, and a large granite-built cathedral. There is rly. connexion with Sucre and La Paz. In the 17th century the city had a pop. of 150,000; now it supports some 40,000. See Bolivia.

Pot-pourri (Fr., rotten pot). French translation of *olla podrida* (*q.v.*), the name of a Spanish dish, made up of different kinds of meat and vegetables, minced and stewed. The word has come to be used for any composition, literary or musical, put together without regard to order and with no particular connexion between the parts. The name is in common use for a mixture of dried rose petals, lavender, and spice kept for its fragrance in china jars.

Potsdam.

Town of Germany. Formerly, as capital of the Brandenburg prov. of Prussia, it was the residence of the Hohenzollern kings and emperors. It is 10 m. W. of Berlin's suburbs, on the Havel and several of the lakes formed by the river, which provide a navigable waterway to Berlin. The centre of minor industries — flour

mills, chemical and food preserving plants—and of market gardening enterprises; known also for schools, museums, and scientific institutions (including an observa-



Potsdam. The New Palace, built 1763–69, by Frederick the Great

tory), Potsdam was chiefly important for having become synonymous with the Prussian spirit.

The Wendish fishing village Poztupimi, which existed from about 993, was chosen by the Great Elector for the settlement of Huguenot refugees in 1685. He built a palace here, 1660–82. Potsdam was greatly enlarged by Frederick William I, and under Frederick the Great attained splendour of architecture and the position of a German Versailles. The chief buildings date from the 18th century: the Barberini palace, the marble palace, and, most famous of all, Frederick's rococo summer palace of Sans-Souci, where he entertained Voltaire and other writers; also the art gallery, new palace, and the triumphal arch of the Brandenburg gate. There are fine parks, and the gardens were formerly laid out in elaborate formal patterns. The garrison church, 1732, has a famous chime and a crypt containing Hohenzollern tombs. Much of the town was destroyed during the Second Great War when it was captured by the Russians April 27, 1945; but Sans-Souci and some of the minor buildings remained intact. After the surrender of Germany, Potsdam lay within the Russian zone of occupation. Pop. (1950) 116,500.

The Russian-Prussian alliance against Napoleon was signed at Potsdam, Nov. 3, 1805. William II and Nicholas II agreed to a non-aggression and friendship pact here, Nov. 5, 1910. Hitler's Third Reich was proclaimed in the garrison church, March 21, 1933. The Allied conference of 1945 is noticed separately.

Potsdam Conference. Name commonly given to a meeting of representatives of the U.K., the



Potosí, Bolivia. The Cerro Rico (rich hill), pitted with the shafts of innumerable silver mines

U.S.A., and the U.S.S.R. (officially called the Berlin conference) which met in the Cecilienhof palace, Potsdam (once the home of the crown prince), July 17-25 and July 28-Aug. 1, 1945. The delegations were headed by President Truman (U.S.A.), Generalissimo Stalin (U.S.S.R.), and, July 17-25, Winston Churchill, July 28-Aug. 1, Clement Attlee (U.K., where the July general election resulted in a change of govt. during the conference). It was called to decide on the future of Germany following its unconditional surrender on May 7, and concluded with the signing, Aug. 1, by Truman, Stalin, and Attlee of the Berlin (popularly called the Potsdam) agreement, the principal points of which were:

(1) A council composed of the foreign ministers of the U.K., the U.S.S.R., China, France, and the U.S.A. was to be established and to draw up for submission to the United Nations treaties of peace with Italy, Rumania, Bulgaria, Hungary, Finland, and Germany.

(2) Supreme authority in Germany was to be exercised, on instructions from their respective govts., by the Cs.-in-C., of the armed forces of the U.S.A., the U.K., the U.S.S.R., and France, each in his own zone of occupation, and also jointly, in matters affecting Germany as a whole, as members of the control council.

(3) The purposes of the occupation were the complete disarmament and demilitarisation of Germany and the elimination or control of all German industry that could be used for military production; to convince the German people that they had suffered a total military defeat; to destroy the National Socialist party; and to prepare for the eventual reconstruction of German political life on democratic lines. No central German govt. was to be set up for the time being, but essential central German administrative depts., headed by state secretaries, were to be established. During the occupation Germany was to be treated as an economic whole.

(4) Reparation claims by the U.S.S.R. were to be met by removals from the Russian zone of occupation and appropriate German external assets; in addition, the U.S.S.R. was to receive 10 p.c. of capital equipment in certain categories from the western zones free, and another 15 p.c. in return for an equivalent value of agreed commodities. The U.S.S.R. undertook to settle Polish reparation claims from its own share. Repar-

ation claims by the other Allies were to be met from the western zones and appropriate German external assets.

(5) The conference agreed in principle to the proposal by the U.S.S.R. for the ultimate transfer of Königsberg to the Soviet Union.

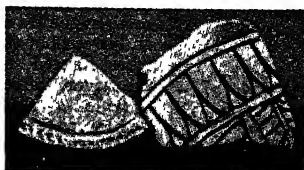
(6) The three heads of govt. reaffirmed their intention to bring major war criminals to swift and sure justice; and (7) their opinion that the final delimitation of the western frontier of Poland should await the peace settlement; they agreed, however, that pending that settlement the area of Germany E. of the Oder-Neisse rivers (see Poland: map) should be administered by Poland.

(8) The three govts. also recognized that the transfer to Germany of German populations, or elements, remaining in Poland, Czechoslovakia, and Hungary would have to be undertaken, but it should be effected in an "orderly and humane manner."

POTSDAM ULTIMATUM. While the Potsdam conference was in session, a "peace feeler" from Japan reached the representatives of the U.K. and the U.S.A. through the U.S.S.R. (not then at war with Japan). They replied, with the concurrence of Chiang Kai-shek, president of the Chinese govt., by the Potsdam ultimatum of July 26 which called upon the government of Japan to proclaim "unconditional surrender of all the Japanese armed forces, and to provide proper and adequate assurances of their good faith in such action. The alternative for Japan is complete and utter destruction." Japan rejected the ultimatum.

Potsdam Sandstone. In geology, name given to rocks of the Upper Cambrian. So called from their typical formation at Potsdam, N.Y., they consist of red or yellow sandstones, and are extensively used as building stones. They are found on the edge of the Adirondacks, in Virginia, Michigan, and Wisconsin. See Cambrian System.

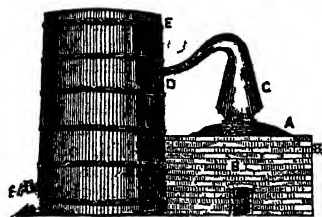
Potsherd. Fragment of an earthenware pot, or any broken piece of earthenware. In archaeological exploration such sherds or



Potsherd of Egyptian glazed ware, c. 1800-1800 B.C.

shards are of great importance, often enabling the successive layers in ancient settlements to be identified. A West Asian ruin-mound may exhibit Neolithic sherds at the base and Byzantine or Arab pottery on the surface, with several civilizations between. Old foundations beneath London may prove to be Romano-British, Saxon, or Tudor. The largest heap known is Monte Testaccio, in Rome, 1,000 paces round by 115 ft. high, comprising fragments of imported jars, and proving an extensive trade with Spain and Africa. Potsherds sometimes illustrate decorative styles otherwise unknown, and in Ptolemaic and Roman Egypt were largely used for business memoranda. In Anglo-Saxon graves they were intentionally thrown upon the body, a superstition mentioned in Hamlet. See Ostraca; Pottery.

Pot Still. Simple form of intermittent still, as distinct from the patent (continuous) still. It is used for distilling malt whisky in Scotland, and for both malt and



Pot Still of common type. For explanation see text

grain whisky in Ireland. The diagram illustrates a common form of pot still. The still, A, encased in brickwork, B, is directly over the fire. The head of the still, C, is attached to the condenser, D, which enters the tub, E. There the vapour is condensed and is drawn away into a receiver at F. See Distilling; Potteen; Still; Whisky.

Potter, BEATRICE HELEN (1866-1943). British writer. She published her first book for children, *The Tale of Peter Rabbit* (q.v.), in 1902; illustrated by herself, it established her fame, and was the precursor of a series of ingenious animal stories. Much of the detail of her stories, as of her pictures, came from experiences of visits to, and later, residence in the Lake District. Other characters



Beatrix Potter, British writer

include Squirrel Nutkin, Jemima Puddleduck, Mrs. Tiggy-Winkle (hedgehog), and Tom Kitten. She married William Heelis, a Lakeland solicitor, in 1913. Dying at Ambleside, Dec. 22, 1943, she left properties in the district to the National Trust. Hill Top Farmhouse became a permanent memorial to her, and some of her original water-colour illustrations are exhibited there. Consult the biography by M. Lane, 1946.

Potter, PAUL (1625-54). Dutch painter. Born at Enkhuysen, he was a pupil of his father, Pieter, at Amsterdam, and of Jakob de Wit at Haarlem. He painted landscapes with horses or cattle, generally on rather a small scale; but his famous Bull, now at the Maurits-huis, at The Hague, is nearly life-size. He passed his life in Holland



Paul Potter,
Dutch painter
After B. van der Helst



Beatrix Potter. One of her famous characters, Mrs. Tiggy-Winkle

Trent. The Potteries cover about 9 m. in length by 3 m. in breadth on the N. Staffs coalfield, constituting the chief centre in the U.K. making china, earthenware, etc. See Bennett, E. A.; Five Towns; Stoke-on-Trent.

Potter's Bar. Urban district of Middlesex, England. Situated on the Great North Road, 3 m. N. of Barnet, it has a main line rly. station. The district is controlled by an urban district council. Here on Oct. 1, 1916, a zeppelin was brought down in flames by Lieut. W. J. Tempest, the bodies of the crew being buried in the locality. Between the two Great Wars Potter's Bar, which had previously been a quiet village, expanded rapidly into a residential suburb for London workers. Pop. 16,000.

and died at Amsterdam. See Dutch School illus. p. 2879.

Potteries, THE. District in N. Staffordshire, England. It includes the towns of Burslem, Fenton, Hanley, Longton, Stoke-upon-Trent, and Tunstall, all of which were united, March 31, 1910, to form the co. bor. of Stoke-on-

of coloured enamelware (1557). Italian influence was still notable even with the 17th century decline in Italy. Delft in Holland made a ware, that was a kind of compromise between Italian majolica and Chinese porcelain, the methods being Italian, the designs Chinese. Italian potters settled in France, at Nevers, Rouen, and Moustiers.

English potters of the 16th and 17th cents. produced ware of a homely character, porringers, bowls, "tygs" (many-handled loving-cups), etc., the Staffordshire potters rediscovering the Roman art of painting on a dark clay with one of lighter tone. Wrotham, Kent, was another important centre for this class of decorated slipware (slip being the term for thin fluid clay applied as an extra surface before baking). A later and more elaborate style was developed at Leeds. It was a Burslem potter, Astbury, who discovered the peculiar properties of calcined flint, ground to powder, when combined with an earthenware body. But Josiah Wedgwood (1730-95) did most to raise the quality of English ware.

Early Stoneware

The development of stoneware so called from its greater hardness was contemporaneous with that of earthenware. Generally it was classed as *grès de Flandres* or Cologne ware. It was finished in the natural colour of the clay and glazed with salt during the firing.

Stoneware came to England from the Low Countries and Germany, the first English factories being set up at Fulham in 1611. Mortlake followed on the same lines in 1752, but fine salt-glazed stoneware was being produced at Burslem as early as 1690.

It was porcelain that chiefly occupied the potters of the E. The Chinese invented it, and great perfection in the art was attained during the Ming dynasty, 1368-1644, when wonderful colour effects were produced. In Europe, France preceded Germany in porcelain production, but before the discovery of the true clay in 1768, it was artificially composed; the first soft paste was made at St. Cloud, 1698. In 1740 a factory was established at Vincennes, which was later removed to Sévres.

The introduction into Europe of true porcelain was a distinction left to Dresden. In England, Chelsea wares were the earliest, specimens of excellent workmanship dating back to 1745. London also made porcelain at Bow from 1744, but the whole of the plant

POTTERY: HISTORY & MANUFACTURE

* David Le Roi and Gordon Stowell, A.R.C.A.

An account of the origin and development of the potter's art is followed by a full description of the modern processes employed in manufacture, firing, decorating, and glazing. Cross-references to other entries on the subject are given at the end of the article

Pottery is the general name given to earthenware fabrics, vessels, ornaments, etc. The shapes are fashioned out of moist plastic earths (clays), hardened by air-drying or by firing. It was probably invented E. of the Caspian, whence it spread to the Persian Gulf and to pre-Sumerian Eridu and Ur. Its presence in Danish kitchen-middens suggests that it existed in Neolithic Europe. The primeval fabrics were fired on the open hearth by the women of the household. Most of the world's utilitarian and hand-made pottery has been, and is, produced by women; their crude undecorated jars are still fired on the hearth in the Outer Hebrides. The fashioning of vessels on rounded pebbles or pivoted stone disks enabled the potters to keep the fabrics turned towards them as they modelled the clay, and this practice culminated in the invention of the potter's wheel, perhaps in early

dynastic Egypt, where also the open hearth was replaced by the pot-oven or kiln. Enamelling, painting, turning, varnishing, and glazing were later developments.

Greek pottery vases of good form of workmanship date from 900 B.C., the fine vase period extending from the 7th to the 3rd centuries. Enamelled earthenware was introduced into Europe mainly through the Moors in Spain, the art spreading to Majorca and Sicily, thus preparing the way for the great works of the Italian Renaissance. Many Italian cities became famous for ceramic productions, e.g. Gubbio, Faenza (hence the name *faience*), Siena, Urbino, Pesaro. Among the great masters of the art are Luca della Robbia, Giorgio Andreoli, and Francesco Xante. It was probably a piece of Italian majolica that inspired the Frenchman, Bernard Palissy, in his experiments which led to the perfection of his process

and stock was transferred to Derby in 1776. Worcester made porcelain from 1751, using from 1755 the true kaolin or china clay which had been discovered in Cornwall. The discoverer, W. Cookworthy, opened a factory at Plymouth, 1768, transferred to Bristol three years later. Plymouth paste was a true hard porcelain, and Bristol body is the hardest known, not excluding the ideal Chinese ware. The Bristol works were closed 1781.

During the 19th century pottery manufacture increased enormously in every country, greatly helped by the introduction of machinery and the invention of new processes; but on the whole these were all based on the processes of the late 18th century. In England the old Derby works ceased and a new factory took its place, while such well-known names as Spode and later Copeland, Minton, and Doulton, first became prominent. The district now known as the city of Stoke-on-Trent, became the centre of the British pottery trade.

POTTERY MANUFACTURE. Clay deposits are of many grades, but mostly so coarse that cracks occur when they are fabricated and kilned. The commonest clays are suitable only for making bricks and tiles. China clay in the U.K. is found in Dorset, Devon, and Cornwall, the finest deposits being at Carclaze, Cornwall. The clay is formed by the decomposition of granitic rock, and consists of the hydrated silicate of alumina, with traces of lime, potash, soda, and magnesia. But even this is seldom used in its natural state for pottery, and different manufacturers use various admixtures, based on china clay, flint, Cornish stone, or calcined bone.

For good quality pottery, ball clay and china clay are separately mixed with water in a "blunger," which is a vat or hopper with mechanically operated blades that rotate and churn the liquid to the required consistency. The clay is fed into the upper part of the vat and the knives are so placed that they knead and mix the clay downwards to eject it in the form of a cream through an opening in the bottom of the hopper. The blunging process takes from two to eight days. The additional ingredients are ground in stone mills to the consistency of fine powder, sifted through a silk screen, and mixed with water. The clay and the other ingredients are then run into separate arks, or

storage tanks, where they are kept in agitation to maintain their consistency until they are required for blending.

From the storage arks the correct proportion of each ingredient is pumped into a measuring tank, then run into a blending ark. The mixed liquid is then passed through fine sieves as well as over an electro-magnet to extract ferrous matter, then pumped by pressure into filter presses (flat chambers lined with linen), which leave a thin square slab of plastic clay weighing approximately 1 cwt.

This clay being too solid for working, it is next passed through the pug mill, where it is made homogeneous, and whence it is extruded in a snake-like roll cut into suitable lengths.

Throwing and Casting

Clay articles may be cast from moulds or turned or "thrown" on a wheel. Throwing on the potter's wheel is the most ancient method of making pottery, the only important modification since Egyptian times being the substitution of mechanical for manual power. A ball of soft clay is thrown on to the centre of the wheel, and the thrower works the rotating mass into a cone. Then he presses it down again, and continues working it up and pressing it down until he is satisfied that the clay is of even consistency and running true on the wheel. The mass of clay is then opened out by pressing the thumb into the centre and pulling the clay into a cylindrical shape. Finally, with one hand inside and the other out, the thrower forms the vase or other article, which is then cut away from the wheel with a short length of wire and set aside to dry partially.

When dried to a green hardness not unlike the consistency of cheese, surplus clay is shaved off by lathe to the correct outline and dimensions. The lathe is then reversed, and the article burnished.

Mass-produced articles are cast from plaster of Paris moulds. Plates and other shallow articles are made on a machine called a jigger. A ball of clay is placed on a revolving disk over which it is evenly distributed by the lowering of an automatic spreader. The bat, or circular pancake of clay so formed is then placed on a plaster mould, which shapes the front of the plate as it is rotated at high speed. The back of the plate is formed by a horizontal metal profile, which also rotates. Cups and small basins are shaped on a

"jolley." A ball of clay is placed in a mould to form the outside of the article. The mould containing the solid piece of clay is placed on the rotating head of the jolley, when the cup-maker draws up the clay from the inside. A metal profile is then lowered to form correctly the inside of the cup, the setting and pressure on the profile governing the thickness of the cup.

Handles are made by pressing from a mould, by casting, or from clay squeezed into long strips through a machine and then cut and shaped by hand. The handle is fixed to the jug, cup, or other article with a touch of clay mixed with water. Embossed ornamentations, which are cast from moulds, are applied by hand after moistening the surface with water.

Having dried to white hardness, the clay pieces are ready for the first, or bisque, firing. In older potteries, where kilns are coal-fired, the articles are placed in coarse earthenware containers called saggars. These prevent uneven baking, and also protect the pieces from smoke. In large modern potteries the kilns are electrically fired, and it is unnecessary to employ saggars. Cups, vases, and bowls are placed on racks, while plates are bedded in layers of sand. After having been subjected to a maximum temperature of 1200° C., the articles are cooled, and the clay has been transformed into a hard, durable, but porous substance known as bisque, or biscuit.

Decorating and Glazing

After this initial firing, the articles may be decorated, either by a printed design or by hand-painting. Sometimes they are glazed before decorating. Under-glaze colours are more durable, but the high temperature of the glazing kiln limits the number of colours which may be used. The printed design is applied to the article in the form of a transfer. As an oil vehicle is used for mixing the colours, and the paper backing to the transfer prepared with a water medium, immersing the pottery in water removes the paper and leaves the pattern upon the ware. The article is then passed through a hardening-on kiln which fixes the colours printed on the biscuit, or fuses the colour to the glaze in the case of those printed on the glaze. Printed patterns can be enriched by the addition of ceramic enamels.

The painter uses a great variety of colours, all metallic oxides.



Pottery. Modern methods of manufacture. 1. Pug machine, which prepares the clay. 2. Automatic moulding. 3. Casting from plaster mould. 4. Shaping by means of a "jigger." 5. Stacking "saggers" for firing in intermittent oven. 6. "Biscuit" entering electric oven. (J. Wedgwood & Sons, Stoke-on-Trent)

For overglaze painting, fluxes or colours containing glaze in the mixture are required. From gold is obtained crimson; from cobalt, blue; from chromium, green; from iron, red; from antimony, yellow. Considerable experience is necessary, as the purity of tone, and sometimes even of colour, does not appear until after firing. The ceramic decorator's greatest difficulty is that some colours will not mix with others, but will react in the fire to their mutual destruction.

Glazing may be done before or after decorating, except with enamel, which requires a final firing. The article is dipped in a liquid glaze compound of frit (a glass-like substance ground and mixed with water), clay and flint. The water from the glaze is absorbed by the porous biscuit ware, leaving a thin film of glaze on the surface of the piece, which is then dried in a heated chamber before passing to the glost oven. While in the oven, the articles are separated by fire-clay supports to prevent them from being pressed

together by the glaze, which vitrifies at high temperature.

Firing enamelled ware is the last process of manufacture, and some highly-decorated pieces require repeated firings according to the number of colours employed, certain colours having to be applied after preliminary firings. In the process of heating, particularly when the kiln is not constant-heated by electricity but is coal-fired, there is sometimes unequal expansion and contraction of the clay and its glaze, resulting in the enamel being covered with a network of little splits. When the network is very fine it is called speckled, and when coarse, cracked. This is occasionally deliberately done as a form of decoration.

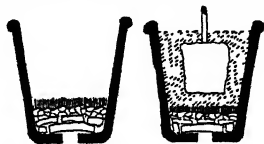
Salt-glazed ware or stoneware is used for such common articles as drain-pipes or ginger-beer bottles. The clay article is exposed to the intense heat of an open oven or kiln, no protection being placed between the fire and the clay. When the ware is almost at white heat, a quantity of common salt is thrown upon the fires and dropped

through holes in the dome of the oven. Volatilisation takes place, and the salt vapour clings around the ware; the silica in the clay combines with the sodium from the salt, forming a thin glass glaze on the surface of the piece, while the chlorine, being set free, escapes. See *Ceramics*; *China-ware*; *Coalport*; *Della Robbia Ware*; *Derby China*; *Dresden China*; *Doulton*; *Greek Art*; *Jug*; *Majolica*; *Pallissy, B.*; *Sèvres*; *Wedgwood*; *Worcester*, etc.

Bibliography: *History of Pottery and Porcelain*, J. Marryat, 1868; *History of Ancient Pottery*, S. Birch, 1873; *History of Ceramic Art*, A. Jacquemart, Eng. trans. B. Palliser, 1873; *Pottery and Porcelain*, F. Litchfield, 1900; *Porcelain*, E. Dillon, 1904; *Chats on Old China*, A. Hayden, 1906; *A General History of Porcelain*, W. Burton, 1921; *A Potter's Book*, B. Leach, 1940; *English Pottery and Porcelain*, W. B. Honey, 1945; *The Art of the Potter*, W. B. Honey, 1946.

Potting. Placing plants either from the open ground or from seed boxes in pots, usually for cultivation under glass. Both pots and

saucers, before use, should be scrubbed inside and out to ensure cleanliness and proper porosity. To secure the necessary drainage, the pot should be filled to about one-third of its depth with pieces



Potting. Sectional views showing, left, correct method of placing broken matter in pots; right, position of plant when potting

of broken pots, chips of brick, oyster-shell, broken charcoal, etc. The usual potting mixture is loam and leaf mould, with a liberal mixture of sand, the latter inducing the plant to throw out fresh roots. *See Gardening.*

Potton. Market town of Bedfordshire, England. It is 11 m. by rly. E. of Bedford. The old church of S. Mary has a Norman font. The industries include engineering works, market gardening, and the making of leather and parchment. Potton was formerly a centre for straw plaiting and lace making. Pop. 1,955.

Pott's Fracture. Fracture of the lower end of the fibula, called after the man who suffered from it and first described it. It is associated with injury of the lower articulation between the tibia and fibula, the two long bones between the knee and the ankle. It can easily be mistaken for a sprain.

Pottsville. City of Pennsylvania, U.S.A., the co. seat of Schuylkill co. It stands on the Schuylkill river, 35 m. N.N.W. of Reading, and is served by rlys. Picturesquely situated at 700 ft. alt. on the declivity of steep hills, it is much visited by tourists and is the centre of an anthracite region. Among industrial plants are rly. workshops, boot and shoe and shirt factories, and textile and silk mills. Buildings include the co. court house and a public library. Pottsville, settled about 1800, was made a corporate town in 1828. There were Molly Maguire (*q.v.*) disturbances here, especially in 1876-77. Pop. 24,530.

Potwalloper. Name formerly given in certain English boroughs to the man entitled to vote at parliamentary elections. The origin of the word is doubtful, but it has some connexion with the right of boiling a pot, i.e. the right to a fire and hearth, this giving the right to the franchise.

There were potwallopers in Taunton until their rights were extinguished by the Reform Act of 1832.

Pouched Rat (*Geomys*). Genus of about eight species of burrowing rodents of the family Geomyidae. They are natives of N. and Central America. They have small eyes and ears, and fur-lined cheek pouches opening to the exterior. The fore-feet have strongly developed claws fitting them for digging. The best known species is the pocket gopher (*q.v.*).

Poughkeepsie. City of New York, U.S.A., the co. seat of Dutchess co. It stands on the E. bank of the Hudson river, 75 m. N. of New York City, and is served by the New York Central and Hudson River rly. and by a steam ferry. The Hudson is here crossed by a handsome cantilever bridge almost 7,000 ft. long. Poughkeepsie is the seat of Vassar College, and contains the Adirance memorial library and several educational and benevolent institutions. The manufactures include clothing, dairy machinery, and oil separators. Settled by the Dutch in 1698, Poughkeepsie became the state capital in 1778, and received a city charter in 1854. Pop. 40,478. *Pron. P'k-ippsey.*

Pouillet, CLAUDE SERVATS MATHIAS (1791-1868). French physicist. Born at Cusance, he was educated at the École Normale, Paris. He became director of the Conservatoire des Arts et Métiers in 1831, resigning in 1849 to make a study of physics. Famous for his invention of the tangent and sine galvanometers and of a type of pyrheliometer, he died June 15, 1868.

Pouishnoff, LEFF (b. 1891). Russian-born British pianist. Born Oct. 11, 1891, he studied at St. Petersburg (Leningrad) conservatoire, where he won the Rubinstein prize. He played in public at Uman in 1896, and first appeared in London in 1912. In the principal European cities and in the U.S.A. his Chopin recitals were well attended. A British subject from 1931, Pouishnoff composed works for the piano, including *Quand il Pleut*; *The Musical Box*; *Petite Valse*. His wife Dorothy (Hildreth) was also a pianist.

Poulaines or **POLEYNs**. Long pointed shoes worn in the 14th

and 15th centuries, also termed Crackowes. It is assumed that they gained this latter name from Cracow and the former from Po-



Pouched Rat. The American rodent with large cheek pouches

land, whence, apparently, the fashion came. *See Boots and Shoes.*

Poulenc, FRANCIS (b. 1899). French composer, born in Paris, Jan. 7, 1899. He began to compose during the First Great War, one of his earliest works being *Rapsodie Nègre*. Influenced by Satie, he opposed the impressionist school, and was one of the group known as Les Six. Of his ballets the best-known was *Les Biches*, 1923; his comic operas included *Le Gardarme Incompris*, and *Les Mamelles de Tirésias*. Poulenc wrote much for wind instruments and for piano. His inventiveness and sophisticated humour were at their best in such works as *Cocardes*; *Marches et un Intermède*; *Bal Masqué*. He also made settings of Apollinaire's poems.

Poulsen, VALDEMAR (1869-1942). Danish electrical engineer. Born at Copenhagen, Nov. 22, 1869, he joined the Danish telephone service, and in 1898 invented the telegraphophone, an electromagnetic phonograph registering human speech by magnetism. In 1903 he developed a singing arc which utilised inductance and capacity to produce continuous oscillations. The Poulsen arc was used by radio stations throughout the world, but was ultimately modified by later techniques. He died in New York on Aug. 6, 1942.

Poulsters' Company, THE. London city livery company. Existing as a voluntary association in the middle of the 14th century, it was first incorporated by charter, June 13, 1665. The office of the company, which lost its hall and other property in the Great Fire of 1666, is at 16, St. Andrew Street, E.C.4.

Poulton, SIR EDWARD BAGNALL (1856-1943). British scientist. Born at Reading, Jan. 27, 1856, he



Leff Pouishnoff,
Russian-British
pianist



Poulsters' Com-
pany arms

was educated at Jesus College, Oxford, where he took high honours in natural science. In 1877 he was made demonstrator in comparative anatomy at the university museum, and in 1893 Hope professor of zoology at Oxford, holding the chair for 40 years. He was vice-president of the Royal Society, 1909-10; president of the Linnean Society, 1912-16; of the British Association, 1937; and several times of the Royal Entomological Society. Among his books are *Charles Darwin and the Theory of Natural Selection*, 1896; *C. D. and the Origin of Species*, 1909. Knighted in 1935, Poulton died Nov. 20, 1943.

Poulton-le-Fylde. A market town and urban dist. of Lancashire, England. It stands on the river Wyre, 3 m. N.E. of Blackpool, and is served by rly. It has an interesting church, S. Chad's, and a market cross, near which are preserved the stocks and whipping-post. At one time Poulton was a seaport. Market days, Mon. and Thurs. Pop. 7,600.

Poultry (Old Fr. *pouletrie*, cf. Eng. *pullet*). General term for domesticated fowls, ducks, geese, and turkeys. Poultry farming may be defined as the breeding of poultry for profit derived from eggs or table birds. A poultry farm may be from five to five hundred acres in extent, and the stock may be mixed or of one breed only.

A successful poultry farmer needs a natural aptitude for the work and previous experience with poultry either on a farm as a pupil, or through a course of training at an agricultural college. Knowledge of fowls and their ailments, of foodstuffs and their constituents, of mating, artificial incubation, rearing, fattening, trussing, shaping, and preparing for market is required.

In the British Isles few localities have a soil and situation entirely unfavourable to poultry rearing, but the site should be fairly high, undulating, and well drained naturally and artificially, with a slight slope to the S.E., S., or S.W. Lack of natural drainage and exposure to cold winds are the two great objections to flat land. The soil should preferably be light loam on a gravel subsoil. Hills, woods, or belts of trees on the N. and E. are an advantage, as they afford shelter and break the force of the cold winds from those quarters; hills on the S. and W. are to be avoided as they deprive the site of most of the direct rays of the sun in autumn and winter.

An abundant and unflinching water supply is essential. Proximity to post and telegraph offices and a station on a main line is advantageous, and the farm should also be within short train distance of a good-sized industrial town, since rly. rates for produce are a heavy item of expenditure.

The farm should be equipped with up-to-date houses and appliances, and the advice of a reputable manufacturer of poultry appliances may well be sought by the beginner. The utility breeds of fowl fall into three classes: general purpose breeds that combine table with fair laying qualities, laying breeds, and table breeds. In the first named class are Langshans, Orpingtons, Plymouth Rocks, Rhode Island Reds, and Wyandottes; in the second, Leghorns, Minorcas, Andalusians, and Anconas; in the third, Dorkings, Indian Game, and some of the French varieties, or crosses of these with other breeds.

The general purpose fowls are excellent winter layers. The laying or non-sitting class are wonderfully prolific, they are hardy and quick growers, and their eggs are large, generally weighing over two ounces. Most of their eggs, however, are laid during the spring and summer, when eggs are plentiful and cheap. They possess no value as table birds, their flesh being stringy and hard. The table breeds produce carcasses most suitable for marketing.

Ducks and Geese

Ducks, although aquatic in habit, will thrive almost anywhere, and the best table birds are ducks that have never had a swim. Geese thrive in almost any situation, and so do guinea-fowl. Turkeys need great care as they are delicate. As a general rule they do better on light soils; yet, in a very dry year, when green food is scarce, they may do better reared on a heavy soil, which would not ordinarily suit them. A rich but not heavy soil gives good results in turkey breeding and rearing.

Poultry requires skilful management and enterprise on the farm, combined with careful study of and adaptation to available markets. It is generally considered that no one should embark on poultry farming who is not prepared to carry on for at least two years without profit. The establishment and running of a successful poultry farm entail hard and unremitting work, and constant attention to detail; nor are the profits normally large.

TABLE FOWLS. The price of chickens is normally low in the autumn and winter months when, the egg producing season being over chickens are killed off. Tender and easily digested, chicken flesh is ideal meat for invalids. Quality, uniformity of size, shape, colour, texture of skin and flesh of dressed poultry are important. Small active breeds usually possess small muscle but relatively tough tissue, and the flesh, when prepared for the table, is relatively tough. A well fleshed, compact body, with short legs and wings, is generally looked for in dressed poultry of good quality. Large birds have coarse flesh.

Age can be judged by the thick connective tissue surrounding the muscle fibres, and the coarseness of the flesh. The age of dressed fowls is detected by the hardness and firmness of the keel bone. A young bird has a loose and soft cartilage supporting its keel bone. Dry skin, hairs on the body, scales on the shanks, hardness of the feet, and long toe nails, hard and curved spurs, and hardened windpipe are all indications of age. Coarser skin, larger bones and body, and the development of the spur indicate the male. Capons have small heads and withered combs, narrower and pointed feathers, and undeveloped spurs.

Killing and Plucking

Birds are usually specially fed for three weeks before killing. Milk feeding, with a mash of cornmeal and buttermilk, results in good quality flesh softer than that of a corn fed bird, the skin is whiter, and the flavour better. Before killing, especially after three weeks of concentrated fattening feeding, the bird is starved for 24 hours, to empty the stomach and facilitate bleeding. Proper bleeding of the carcass is essential. The veins of birds not properly bled are usually discoloured, particularly on the breast and neck. If green coloured, showing decomposition of the blood, the bird's flesh may cause ptomaine poisoning.

Plucking is usually done at the time of killing. Scald picking, after the bird has been dipped into water at a temp. of 200° F., is much easier than dry picking, but scalding heightens the colour, tends to destroy flavour, and reduces the time the bird will keep.

After killing and plucking, animal heat is removed, in order to prevent the entrance of bacteria into the carcass, by holding the birds in a chilling temp. of 32° F. for 24 hrs. The carcasses are then

trussed and pressed and wrapped in grease proof paper, and packed, 24 to a case, in light wood cases, average weight of the filled case being 100 lb.

DOMESTIC POULTRY KEEPING. Fowls are kept in the garden usually for their eggs rather than their flesh. An expensive hen house is not necessary as a few hens can live in any shed or large case that is watertight and has a floor than can be kept clean easily. The house must have an opening protected by wire netting, and fitted with a solid, easily operated shutter; a door left open in the day, so that the hens can go in and out at will, but shut and secured at night; and perches inside the shed. Twelve birds need approx. 12 ft. of perch. The shed must have several removable nest boxes, their floors covered with plenty of hay. The whole of the interior should be lime-washed and paraffined to prevent disease.

Fowls in the Run

A run as large in area as possible, and providing not less than 10 sq. yds. per bird, should be enclosed with fencing at least six ft. high. The run should be divided into three parts, the hens using one part at a time. When they have eaten the grass and stamped down the earth on one part they should be allowed into the next, and the first ground prepared for new grass or covered with gravel.

Green stuff—lettuce and cabbage—should be hung on the fencing as high as the hens will jump. This gives them exercise. They should be given all the household scraps mixed with biscuit meal to a crumbly condition (never slop). The ration per bird is 2 oz. of corn and 2½ oz. mash per day; the mash is put in long troughs, the corn is scattered on the ground. Dried grass mowings and potato mash are substitutes. Corn in the morning and mash (served warm) in the evening is the rule.

The "battery" system, in which fowls are deprived of exercise and kept in laying boxes all their lives, is suitable for domestic as well as large-scale poultry keeping.

Fowls suffer from many diseases. Red mite is the most common; washing the house with lime mixed with paraffin is the best cure. For scaly leg or roughening or thickening of the legs, the legs should be soaked in paraffin, the remaining paraffin as well as that which runs off the legs being burned. Birds often get crop bound; salad oil is the best cure.

Successful poultry keeping entails cleanliness, method, and regularity. Thorough cleaning of shed or coop and nesting boxes is necessary at least weekly. Lime washing of interiors should be done every three months. Overcrowding must be avoided. The beginner should buy a few laying pullets and not attempt to rear chicks until he is experienced. When egg production falls off for no apparent reason it is cheaper in the long run to kill, and procure fresh pullets. Egg producing birds, when they must be killed, are usually better boiled than roast. See Bird; Duck; Egg; Fowl, with colour plates; Leghorn; Minorca; Orpington; Turkey, etc.

A. B. Miller

Poultry, THE. London thoroughfare. Linking Cheapside with the Mansion House, E.C., it is named after the market for poulterers held here in early times. On the N. side, S. of Grocers' Hall, stood a sheriff's prison famous as the Poultry Compter, which had a ward set apart for Jews. The poet Dekker and the martyr Bradford were among its occupants. It was taken down in 1815. Poultry Chapel, a Congregational building put up on part of its site, was acquired in 1872 by the London Joint Stock Bank for £50,200, which the congregation employed for the building of the City Temple (*q.v.*). Bunyan's Pilgrim's Progress

was published from a bookseller's shop in the Poultry, and Thomas Hood was born here.

Pounce (Fr. *ponce*, pumice). Powder used for rubbing on vellum or parchment where erasures had taken place, so that ink could be employed without its spreading. Pounce consisted of powdered cuttle-fish bone or sandarac. Sand used, until replaced by blotting paper, for drying writing made with ink was also known as pounce.

Pound. Unit of weight. The English unit of weight is the pound avoirdupois of 7,000 grains divided into 16 ounces. It was made the legal unit of weight in 1855, and the standard pound made of platinum is deposited in the Standards office at the board of trade, while authenticated copies are in the mint, houses of parliament,

etc. One pound is equivalent to roughly 0.4536 kilogram, and one kilogram to 2.2046 pounds. The pound troy consists of 5,760 grains, divided into 12 ounces, and is the measure used for gold and silver. The contraction lb. for pound comes from the Latin *libra*, balance. See Avoirdupois; Grain; Troy Weight.

Pound. British monetary unit, in full the pound sterling. It was originally a weight of silver, i.e. 5,760 grains of a certain standard of fineness. Such a pound weight of silver was a Roman money standard, and was adopted by the countries they conquered. The silver pound was coined in England into 20 silver shillings. The term gradually came to mean the same as the sovereign. In 1816 the silver standard was abolished and replaced by a gold one, the gold sovereign or pound sterling becoming the unit. Weight was fixed at 123.274 grains, and fineness at 22 carats. See Exchange; Sterling.

Pound (A.S. *pund*, enclosure). Enclosure erected by legal authority, in which cattle distrained for



Pound. Enclosure for cattle. The old roadside pound at East Burnham, Bucks

rent, or caught straying and doing damage on land belonging to another than their owner, or straying on the highway, can be confined pending payment of the rent, damages, or penalty and expenses. A pound was either overt—one to which persons could resort without trespassing; or covert—on private property, as when the owner of land on which animals had done damage detained the beasts thereon. Pound breach, in law, is a misdemeanour consisting in the unauthorised removal of distrained animals or goods from a pound, or in doing damage to the pound itself. The goods, in the case of distress, being from the first in the custody of the law, and not in that of the distrainer, their forcible recovery was regarded as a serious offence.

Pound, Sir Alfred Dudley PICKMAN ROGERS (1877-1943). British sailor. Born Aug. 29, 1877,

he was educated at East Grinstead and Greenwich. He commanded H.M.S. Colossus at the battle of Jutland, May 31, 1916. Director of the Admiralty plans div.,

1922-25, he next was chief of staff to Keyes in the Mediterranean. Having been assistant chief of the naval staff, 1927-29, he commanded a battle cruiser squadron, and in 1932 was appointed second sea lord and chief of naval personnel. Knighted 1933, Sir Dudley became C-in-C. Mediterranean fleet in 1936, and was first sea lord and chief of naval staff shortly before the Second Great War. He attended most of the principal conferences between Winston Churchill and Roosevelt, and was taking part in U.N. staff talks, when he died Oct. 21, 1943.

Pound, Ezra Loomis (b. 1885). American poet. Born at Hailey, Ida., Oct. 30, 1885, and educated at Pennsylvania university, he settled in Europe in 1907 and founded the Imagists school of poetry. A scholar with a remarkable knowledge of medieval literature and a gift of rhythmic invention, he became known both for individual verse and for translations of Provençal, Latin, Chinese, and Italian poets. His works included *Canzoni*, 1911; *Ripostes*, 1912; *Umbra* (collected early poems), 1920; *Personae*, 1926; and several volumes of *Cantos*. In prose he wrote a *Life of Gaudier Brzeska*, 1916; *Indiscretions*, 1923; *Imaginary Letters*, 1930. An admirer of fascism, he was accused of treason, having broadcast in Italy for Mussolini during the Second Great War, but was declared mentally unsound by an American district court jury in 1946.



Ezra Pound,
American poet

Poundal. Unit of force. It is the force which, acting on one pound weight, gives it an acceleration of one foot per sec. per sec.

Hence a pound weight (which when falling acquires a velocity of 32.19 ft. per sec. per sec.) equals 32.19 poundals, or a poundal equals 0.031 lb. wt.

Pounds, (Charles) Courtice (1862-1927). British actor and singer. Born in London, May 30, 1862, and trained at the R.A.M., he made his first success in the part of Fairfax in *The Yeomen of the Guard*, at the Savoy Theatre, London, 1888. He appeared in all Gilbert and Sullivan operas there until 1892, and afterwards toured in Australia and America. He acted in *The Duchess of Dantzic*; *Chu Chin Chow* (*q.v.*), in which for nearly five years he played Ali Baba; and *Lilac Time*, creating the part of Franz Schubert. He died Dec. 21, 1927.

Pounds, John (1766-1839). British philanthropist, born at Portsmouth, June 17, 1766. He was apprenticed to a shipwright, but at 15 was crippled through an accident, and became a shoemaker. He became interested in poor children, teaching them reading, arithmetic, and the rudiments of useful knowledge, and thus originated the movement for the institution of ragged schools (*q.v.*). His influence among the poor was great, and after his death, Jan. 1, 1839, several memorial schools were established.

Poupart's Ligament. Ligament running along the groin from the bony prominence of the pelvis at the side of the lower part of the abdomen to a bony point near the middle line. See *Anatomy; Man*.

Poussin, Gaspard, or Le Gaspre (1613-75). French painter, whose real name was Gaspard

Dughet. Born at Rome, of French parentage, he studied under his brother-in-law, Nicholas Poussin, who had become a member of the Dughet household, and whose name he adopted. Later he came under the influence of Claude. He excelled in stormy landscapes. He died at Rome, May 27, 1675.

Poussin, Nicholas (1594-1665). French painter. Born at Villers, near Les Andelys, Normandy, he studied under Quentin Varin and in Paris.



Nicholas Poussin,
French painter
Self-portrait

In 1624 he made his way to Rome, and after a hard struggle obtained the patronage of Cardinal Barberini. Painting historical pictures and landscapes in the classical style, he rapidly achieved fame, and in 1640 was induced by Richelieu to come to Paris as painter to Louis XIII. In 1643 he returned to Rome, to fetch his wife, the sister of Gaspard Dughet, and never returned, dying at Rome, Nov. 19, 1665.

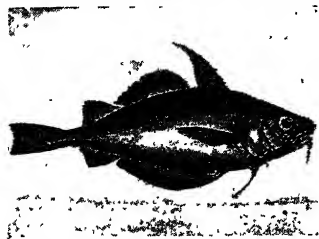
In Paris Poussin executed a *Last Supper*, for a royal chapel, and *Triumph of Truth*, for Richelieu. Probably his most famous picture is the *Vision of St. Paul*. His essentially classical art and his practice of incorporating figures from Raphael and other old masters had great influence on French painting. He is well represented in England in the National Gallery and at Dulwich, and splendidly in the Louvre.



Nicholas Poussin. *The Triumph of Flora*, depicting the goddess in her car, drawn by Cupids, two of whom are crowning her with flowers: one of the artist's most beautiful classical paintings
Louvre, Paris

There are studies by P. Desjardins, 1903; W. Friedländer, 1914; E. Sutro, 1923.

Pout (*Gadus luscus*). Marine fish of the cod family. Nearly related to the whiting, from which,



Pout. Fish, nearly related to the whiting, found around the W. shores of Europe

however, it differs in the possession of a chin barbel and deeper body, it occurs round the W. shores of Europe, and reaches a weight of 5 lb. The pout is also locally known as the bib and brassy, and it is to some extent used for the table. See Fish.

Povindah. Class of Afghan merchants engaged in the caravan trade between India and central Asia. Mostly Ghilzai, they migrate each autumn from their Ghazni homes with their families, flocks, and herds, which they leave behind on reaching the Indian frontier. Thence they carry the produce of Bokhara and Samarkand through the sub-continent.

Powder Metallurgy. Metal working process. The founder of this branch of metallurgy was W. H. Wollaston (*q.v.*) who, at the beginning of the 19th century, introduced a process for producing ingots of platinum without melting, the temps. attainable with the furnaces of his day being inadequate to melt the metal. He compressed platinum sponge in a small brass barrel, removed the cake, and heated it to about 1,500° C. (more than 250° below the melting point of the metal), when it formed into a solid block which could be forged or drawn into wire. Later tungsten powder was similarly treated. In the 20th century the method was applied not only to those metals which are difficult to fuse, but also to metals such as copper and iron in the manufacture of articles too complex in shape for casting, or in particular applications.

Metal powder is prepared to about the fineness of coarse flour or fine sand; it is screened to pass a 150-mesh British standard screen, little of it being below 350 mesh. The particle size, usually distri-

buted fairly evenly between 150 and 350 mesh, varies with the metal used and the article to be manufactured. The commonest method of producing the powdered metal is to reduce the metal oxide, which can be easily crushed and sized before reduction. Town gas is commonly used for reducing powdered copper scale to pure copper powder, and iron powder of high purity can be made in this way. The refractory metals, tungsten, titanium, molybdenum, etc., are made in powder form by reduction of their oxides with hydrogen at temps. about half as high as their melting points. Another method is by electrolytic deposition, using current densities very much higher than those normally used for electro-deposition. Copper and iron are deposited in such a form that they can be scraped off the cathode in a powder. Atomisation is used not only for pure metals, such as zinc, but also for many alloys, *e.g.* bronze, brass, and aluminium alloys. The molten metal or alloy is poured into a powerful jet of air or steam, when it disintegrates into a fine powder. Ball mills and other types of attrition mill are used to produce metal powders for paint. Iron and nickel powders can be produced by the carbonyl process, devised by Alfred Mond (Lord Melchett).

Shaping and Sintering

After sieving, the powdered metal is pressed into the shape desired under pressures ranging between 5 and 50 tons per sq. in. Wear on the dies is reduced by introducing a small amount of a lubricant, such as a vegetable oil or stearic acid derivative. The compact is now in such a form that, if it is handled carefully, it does not break. It can also be further shaped, much as clay is shaped by the potter. For example, tungsten carbide tool tips are pressed and then shaped before they are sintered. Sintering, the next process, is a heat treatment. It is carried out in a reducing atmosphere of hydrogen or cracked ammonia for expensive mouldings or a treated coal gas for cheaper work. It is carried out at temps. well below the melting points of the metals used, and even under pressure there is usually no true fusion of the powder particles. Nevertheless, the powder is welded together so that the product is homogeneous and free from pores. Two or more different powdered metals can be sintered to produce a homogeneous alloy without any of the constituent metals having

been fused. A powdered non-metallic element or ceramic material can be added: for example, graphite can be incorporated in bronze bearings to act as a continual lubricant; carbon in copper for current-collecting brushes for electric motors; carbon in tungsten carbide tools; and diamond in grinding wheels. Sintered mixtures of ceramic materials with metals have been tested as materials for use in jet turbine engines.

Typical products of powder metallurgy include radio valves, in which fine tungsten and molybdenum wire is used; porous bronzes for filtering liquids and gases and in aircraft de-icing plant; porous bronze bearings, which are self-lubricating by impregnation with oil or incorporation of graphite; tungsten carbide tools and dies, where cobalt is used as a lower-melting point binder, and titanium carbide with a nickel binder. See Metallurgy.

Powderpost Beetle. Insect of the family *Lyctidae*. These creatures are wood-borers whose name refers to the fine powdery dust that results from their borings. The eggs are laid chiefly in woods that have large pores or vessels, especially oak. The grubs bore into the sapwood and may continue after it is made up into furniture, etc. *Lyctidae* have become established in Great Britain by the importation of infested foreign timber.

Powell, FREDERICK YORK (1850-1904). British historian. Born in London, Jan. 14, 1850, and educated at Rugby and Christ Church, Oxford, he was called to the bar in 1874 and lectured in law at Christ Church. By 1869 he had begun to work with Vigfusson on Scandinavian records, the subject on which his reputation rests, editing and translating two volumes of ancient northern poetry, and preparing Records of Iceland. Powell helped to found the English Historical Review, wrote a History of England, and in 1894 was made professor of modern history at Oxford, where he died, May 8, 1904. A Radical and a free-thinker, he gave much practical assistance to the poor. *Consult Life and Letters*, ed. O. Elton, 1906.

Powell River. Town of British Columbia, Canada. It is 80 m. N.W. of Vancouver, to which it is connected by coastal steamers of the C.P.R. and C.N.R. Here is the large plant of the Powell River Pulp and Paper co. Pop. 7,500.

Power. Term sometimes applied to a political state to denote its influence in world politics. It is usually based on an estimate of its power in a military sense, though sometimes on its economic resources, its size, or its population. Thus we speak of the great powers and the lesser powers. Certain states were defined at the congress of Vienna, 1815, as great powers, though there have been various additions and deletions to the list since that time. See Great Powers.

Power. In physics, the rate of doing work, i.e. the amount of work done in unit time. In the C.G.S. system the unit of power is the watt (*q.v.*), equivalent to 10^7 ergs of work per sec., or 1 joule (*q.v.*) per sec. The power expended by an electric current in watts is given by the product of the current in amperes and the E.M.F. in volts. Commercially a bigger unit, the kilowatt = 10^3 watts, is more usual, and in mechanical engineering power is generally expressed in horse-power, the equivalence being 1 h.p. = 746 watts.

Power. In English law, a right given to a person to dispose of a greater estate in land than he himself owns. A mortgagee of land, for example, may on default being made by the mortgagor, and certain conditions being fulfilled, sell the fee simple of the land although under the modern form of mortgage he has only a lease of it.

Power of appointment is an authority, given by deed or will, for the donee of the power to dispose of property. Thus, the father of a family may make a will leaving his property in trust for his wife for life, and after her death for such of their children in such shares as she shall appoint. A power to appoint amongst a class, as in the instance given, is called a special power. Sometimes it is wider, allowing the donee of the power the right to appoint to whomsoever he pleases. It is then called a general power; and under it the donee can appoint to himself if he chooses.

Power of attorney or letters of attorney is the authority given by one person to another to act on his behalf. In all English-speaking countries it is common, when a man is going abroad, for him to execute a formal deed, appointing someone to act as his attorney or agent in his absence, to manage his affairs generally or certain classes of his affairs, e.g. his business. A power of attorney may

be very general, or it may contain limitations of the agent's authority.

Power Factor. Electrical term. In a D.C. circuit the power in watts is equal to the product of volts and amperes in the circuit. In an A.C. circuit this is not always so, because the current may not be exactly in phase with the voltage, but may lag or lead, according to whether the circuit contains inductance or capacity. The power factor represents the ratio

$$\frac{\text{true power (watts)}}{\text{apparent power (volt-amperes)}}$$

and is never more than unity. It is actually a trigonometrical function (the cosine of the angle of lag or lead of the current). It is important to keep power factor as high as possible, since the heating of cables, etc., is governed by the total current. A lagging power factor, such as is produced by most industrial loads, can be improved by adding condensers to the circuit, thus neutralising the wattless current and reducing the total current carried for a given amount of true power.

Powicke, Sir Frederick Maurice (b. 1879). English historian. From Alnwick, where he was born June 16, 1879, he went to Owens College, Manchester, and Balliol College, Oxford. At the university he was a fellow of Merton College, 1908-15, and went back in 1928 as regius professor of modern history, having held chairs at Queen's university, Belfast, 1909-19, and at Manchester. During 1933-37 he was president of the Royal Historical Society. In 1946 he was knighted, and in 1947 he retired. Sir Maurice wrote *Loss of Normandy*, 1913; *Medieval England*, 1931; *Christian Life in the Middle Ages*, 1935.

Pownall, Sir Henry Royds (b. 1887). British soldier. Educated at Rugby and the R.M.A.,



Sir Henry Pownall,
British soldier

Woolwich, he served in France during the First Great War and was awarded the D.S.O. and M.C. Deputy secretary of the committee of imperial defence, 1936, he was director of military operations and intelligence at the War office 1938-39, and after the outbreak of the Second Great War was chief of general staff, B.E.F., 1939-40, and later inspector-general of Home Guard. He was knighted in 1940

and became C-in-C., Far East, 1941-42; G.O.C., Ceylon, 1942-43; and then C-in-C., Persia-Iraq. Chief of staff to Lord Louis Mountbatten (Viscount Mountbatten of Burma), S.E. Asia command, 1943-44, he retired in 1945.

Powys. Name of a family of British writers. Of the children of the Rev. C. F. Powys, three sons made literary reputations. The eldest, John Cowper Powys, was born at Shirley, Derbyshire, Oct.

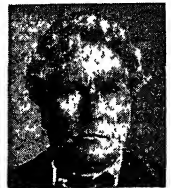


J. C. Powys,
British writer

8, 1872, and spent his early years in the U.S.A., lecturing on English literature. He published several volumes of verse, as well as fiction, without attracting much attention either from critics or from the public, until two volumes of personal philosophy, *The Meaning of Culture*, and *In Defence of Sensuality* (both 1930), were widely acclaimed as examples of the way in which a highly individual personality had reacted to the age of the machine. Of his later successful novels the most generally praised were *A Glastonbury Romance*, 1933; *Jobber Skald*, 1935; *Owen Glendower*, 1941. His autobiography appeared in 1934, and in *The Pleasures of Literature*, 1938, he analysed the style and achievement of many great literary figures.

His brother, Theodore Francis, born at Shirley, 1875, wrote novels and short stories, all set within the limits of a small area in Dorset, where he lived a hermit-like existence for many years. His fiction, written in a somewhat artificial style owing something to the authorised version of the O.T., was in some respects the most striking production of any of the Powys brothers, especially as he often used an ostensibly simple story of country life to convey a moral lesson. His most successful works were *Mr. Tasker's Gods*, 1925; *Mr. Weston's Good Wine*, 1928; *Kindness in a Corner*, 1930; *Captain Patch*, 1935.

The third brother, Llewelyn Powys (1884-1939), was born at Dorchester, Aug. 13, 1884, and spent long periods in Kenya and



T. F. Powys,
British writer

in Switzerland, fighting against tuberculosis, which he contracted at the age of 25. In spite of continual ill-health, he wrote many books, mainly consisting of essays on religion, philosophy, and the countryside of the W. of England. Among the works which established him as the possessor of a delicate sense of style were *Black Laughter*, 1924; *The Cradle of God* (an account of a journey to Palestine), 1929; *The Pathetic Fallacy*, 1930; *Damnable Opinions*, 1935; *Love and Death*, 1939. On Dec. 2, 1939, having returned to Switzerland, he died at Davos. His letters were published in 1942, and his biography, by M. Elwin, appeared in 1946. *Consult* The Powys Brothers, R. H. Ward, 1935; *Welsh Ambassadors*, L. Marlow, 1936.

John Rowland

Poy. Pseudonym of a British cartoonist, Percy Hutton Fearon (1874-1948). Born in Shanghai, Sept. 6, 1874, educated in New York, he studied art under Herkomer. In 1905 cartoonist for the *Manchester Evening Chronicle*, he later worked on the *Sunday Chronicle* and *Daily Dispatch* until 1913. He achieved wide fame on the *London Evening News*, 1913-35, especially with his satirical creations, *John Citizen*, *Dora*, and *Dilly and Dally*. *Daily Mail* cartoonist 1935-38, he died Nov. 5, 1948. Several vols. of his drawings were published.

Poynings, Sir Edward (1459-1521). Lord deputy of Ireland and originator of Poyning's Law (*q.v.*). Born in Southwark, a connexion of the Pastons of Norfolk, he supported Buckingham's rebellion in 1483 by heading a rising in Kent, but on the failure of the enterprise, escaped into Brittany, where he joined the forces of Henry, earl of Richmond. With that prince he landed at Milford Haven, Aug. 7, 1485, and was at once made a knight banneret. After distinguished military services on sea and land, against the intrigues of Perkin Warbeck, he was appointed lord deputy of Ireland in 1494. He continued in active military and diplomatic service until his death.

Poyning's Law. Statute passed by the Irish parliament in 1494, during the period in which Sir Edward Poynings was acting as lord deputy in Ireland for Henry VII. It enacted that no measures might be introduced into the Irish parliament without the previous sanction of the English king and his privy council; also that all existing English laws should be

deemed to be in force in Ireland. Poyning's Law was not repealed until 1782. *See* Ireland.

Poynter. SIR EDWARD JOHN (1836-1919). British painter. Born in Paris, March 20, 1836, he studied art there at the Beaux-Arts and under Gleyre. He settled in London in 1860. In 1869 he was elected A.R.A., becoming R.A. in 1876, and succeeding Millais as president in 1896.



Sir Edward Poynter,
British painter
Russell

In 1871 he was appointed the first Slade professor at University College, London; was director of art and principal of the training schools at South Kensington, 1871-76; and director of the National Gallery, 1894-1905. His election as P.R.A. brought him a knighthood, and he became a baronet in 1902. His pictures were mostly of neo-classic subjects, after the manner of Leighton and Alma-Tadema. He designed mural decorations at S. Kensington, and mosaics at the houses of parliament. He resigned the presidency of the R.A., 1919, and died July 26 in the same year.

Poynting, John Henry (1852-1914). British physicist. Born at Manchester, Sept. 9, 1852, he was educated at Owens College, Manchester, and Trinity College, Cambridge, becoming a fellow of the latter, 1878. In 1880 he was appointed professor of physics at Masons College, later Birmingham university. In 1884 he formulated Poynting's theorem, proving the flow of energy to be expressible by a simple formula in terms of the electric and magnetic forces at a point. He also contributed to the technique of accurate weighing, and wrote much on radiation. F.R.S.

In 1888, he was president of the Physical Society in 1905. He died at Edgbaston, March 30, 1914.

Pozières. Village of France, in the dept. of Somme. It stands 4½ m. E. of Albert. It was stormed by the British 48th and 1st Australian divisions, July 23-25, 1916, the

Anzacs rushing it on the latter date. Lost in the spring of 1918, its ruins were recovered by the British, Aug. 24. A cross erected on the ruins of the village commemorates Australians who fell in its capture. Here is also a memorial to 14,668 missing Indian soldiers. *See* Somme, Battles of the.

Poznan (Ger. Posen). Province of Poland. It belonged to Prussia from the time of the partition of Poland in the 18th century until 1918, but had been a centre of resistance against the attempts of Germany to crush Polish nationality. It had (1935) a pop. of 2,180,000 in an area of 10,240 sq. m. Poznan is a flat country, with the rivers Warta and Netze flowing into the Oder as its main waterways. Much sugar-beet is grown, and lignite and salt are mined.

Poznan. Fourth largest city of Poland. It is the capital of the



Poznan,
Poland, arms

and in 1296 became a residence of the Polish dukes. Later it was a member of the Hanseatic League. Among the older buildings are the cathedral (1431), the town hall (rebuilt 1536), and several Gothic and Renaissance churches. The university, founded in 1919, had 5,000 students before the Second Great War. It is the centre of an agricultural area. Poznan was captured by the Germans shortly after their invasion of Poland in Sept., 1939, and lay in German-occupied Poland, until taken by the 1st White Russian Army on Feb. 23, 1945, after a month's siege. Pop. 267,962.



Poznan, Poland.

Dzialynski Palace, formerly a Prussian royal residence

Pozoblanco. Town of Spain. In the prov. of Córdoba, it is 32 m. N. of Córdoba. It has manufactures of woollens and leather, and a trade in agricultural produce, while famous fairs are held here. Zinc and silver lead are mined in the vicinity. Pop. 19,730.

Pozzo di Borgo, CARLO ANDREA, COUNT (1764-1842). Russian statesman. Born near Ajaccio,



Count Pozzo di Borgo,
Russian statesman
After Bayler

March 8, 1764, he became a lawyer, and in 1792 was a delegate to the national assembly in Paris. Coadjutor with Paoli in the government of Corsica, 1792-96, he fled to London on

Paoli's fall, and in 1798 went to Vienna, where he mingled in politics and exercised all his power to thwart Napoleon. Entering the Russian diplomatic service in 1804, he helped to conclude the alliance with Austria, but the Franco-Russian treaty of Tilsit, 1807, caused his retirement to Vienna. Hounded by Napoleon, he took refuge in London, remaining there until recalled to Russia in 1812. Persuading Murat to abandon Napoleon, he was active in the congresses of Frankfort, Vienna, and Aix-la-Chapelle. Russian ambassador in Paris, 1814-35, he was transferred to London, retiring in 1839. Died in Paris, Feb. 15, 1842.

Pozzuolana. Mixture of silicates of volcanic origin. It was discovered at Pozzuoli (*v.i.*), and is used, mixed with sand and slaked lime, as a hydraulic cement.

Pozzuoli (Gr. *Dicaearchia*; Lat. *Puteoli*). Seaport of Italy, in the prov. of Naples. It stands on a promontory in the Gulf of Pozzuoli, itself an inlet of the Bay of Naples, 8 m. by rly. W. of Naples. It was a commercial centre, and the sur-

rounding districts were crowded with the residences of wealthy Romans. Its mineral baths, used by the Romans, are still frequented. In the vicinity are temples, tombs, baths, cisterns, the Serapeum or Temple of Serapis, and an amphitheatre where Nero presided at gladiatorial combats, and where S. Januarius was thrown to the lions. From the local volcanic earth is made the famous pozzuolana cement. Puteoli, founded by Greeks as Dicaearchia about 520 B.C., was colonised by Rome in 194 B.C., and became an important trade centre under the emperors. Near the town the British firm of Armstrong established armament works in 1888. Pop. 23,000.

Pradesh (Skt., province, state). Name given to four constituent parts of the Indian Union: Himachal Pradesh, Madhya Pradesh, Uttar Pradesh, and Vindhya Pradesh, called in this Encyclopedia Himachal union, Madhya union, etc.

Prado. Short name for the great art gallery at Madrid, the Real Museo de Pintura del Prado. It contains works by Titian, Velazquez, and Goya, and by Rubens, Van Dyck, Raphael, Correggio, Giorgione, and El Greco. The Spanish school is represented from first to last, and there is a fine collection of Flemish paintings. During the civil war of 1936-39 most of the valuable canvases were sent to Valencia, thence to Catalonia, and finally to Geneva. See Madrid.

Praecepte (Lat., command). English law term denoting the slip of paper on which the plaintiff writes the particulars of the writ that he wishes to issue from the court. It also denotes the particulars of the writ, judgement, etc., filed by an execution creditor. It used to begin "Praecepte A.B. quod, etc."

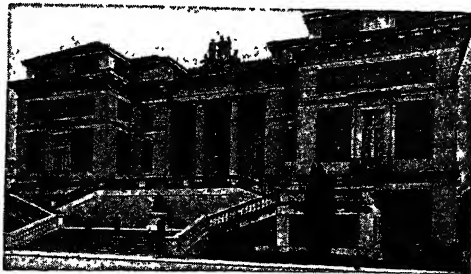
Præd, WINTHROP MACKWORTH (1802-39). British poet. He was born in London, July 26, 1802, and educated at Eton, where he

helped to found the school magazine *The Etonian*, and at Trinity College, Cambridge, of which he became a fellow in 1827. Called to the bar in

1829, he entered parliament as Conservative member for St. Germans. Afterwards he represented Great Yarmouth, 1835-37, and Aylesbury thence until his death from consumption, July 15, 1839. Præd's genius was for light verse, in which he gave full play to his brilliant wit. Among his more serious efforts is *The Red Fisherman*, a poem of considerable imaginative power. An authorised edition of his poems, with a memoir by D. Coleridge, appeared in 1864.



W. Mackworth Præd,
British poet
After A. Mayer



Prado. The Spanish national museum of paintings and sculpture in Madrid

Praefect (Lat. *praefectus*, set over). Title held by various officials appointed by superior authority, not chosen by the people, in the Roman constitution. Under the kings the *praefectus urbi* was deputy governor of the city for the king during his absence, and under the republic was appointed by the consul who last left the city; under the empire the title was revived for an official with extensive police powers and jurisdiction.

Military praefects were the commanders of the imperial bodyguard, camp praefects, of whom each legion had one, the commanders of the engineers, and the navy had fleet praefects, as distinct from ship commanders. An important official in imperial times was the praefect of Egypt, first appointed by Augustus. See Prefect.

Praemunire, STATUTES OF. In English history, name given to certain statutes originally directed against the power of the papacy in England. The name is corrupted from the opening words (*Praemonere facias*, cause to be forewarned)



Pozzuoli, Italy. The amphitheatre in which Nero presided at the gladiatorial combats

of writs against offences of contempt against the crown, and attempts to encroach on the powers of the crown. The first statute, though not so called, of the nature of Praemunire was that of Edward I, 1306, laying down that no tax imposed by religious authority should be sent out of the realm.

The statute of Edward III, 1353, was directed against the papacy, and forbade that matters falling within the jurisdiction of the king's courts should be taken before any foreign court. The most important statute of Praemunire is that of Richard II, 1392, which imposed the penalty of forfeiture on those who should bring into the kingdom any papal bulls, rescripts, etc., without the king's sanction. Later, Praemunire was directed against several miscellaneous offences, e.g. the assertion that parliament could act independently of the sovereign, 1661. See Wolsey.

Praeneste. Ancient city of Latium, now represented by Palestrina (*q.v.*). It lay about 22 m. E. of Rome, on the borders of the country of the Aequi, and was traditionally believed to have been founded by Caeculus, son of Vulcan, its original name being Stephane. Built at the foot of a commanding hill crowned by a fortress, it had considerable strategic importance. It sided with the Latin League against Rome, but was overcome by Camillus, 380 B.C. Captured from Marius by Sulla's lieutenant, Lucretius Ofella, 82 B.C., its territory was divided among the victor's soldiery, and it later became a favourite resort.

The superb Temple of Fortune, built on the terraced hill, stood where the modern town stands, and was famed for its oracle. Claudius Aelianus, 3rd century writer on natural history, was born here. Among archaeological discoveries have been, in 1773, the Roman calendar, known as the Fasti Praenestini; and in 1886, the Fibula Praenestina, a gold brooch inscribed with early Latin of probably the 6th century B.C. See Phoenicia.

Praesepe (Lat., a manger). In astronomy, a star cluster in the constellation of Cancer. To the naked eye it appears as a misty patch of light, and from its shape is popularly known as the beehive. In the telescope it is resolved into a number of stars. *Pron.* preesep'y.

Praetor. Second in dignity among the magistrates of the Roman republic, the consuls being

first. The duties of the *praetor urbanus* were chiefly legal. He was an annually elected official with some of the consul's duties, and had jurisdiction in all civil cases among Roman citizens. On entering his year of office he published an edict setting forth the principles which were to regulate his decisions.

These edicts were the foundation of the Roman civil law. There were also *praetores militares* charged with the administration of provinces. The praetors were preceded by lictors. See Imperium; Lictor.

Praetorian Guard. Household troops of the Roman emperors. In the time of Augustus they comprised nine cohorts of 1,000 men each. The Praetorians played a prom-

inent part in the many revolutions which made and unmade emperors. See Rome.

Pragmatic Sanction (Gr. *pragma*, act, business). Term used in Roman law and afterwards in European politics for a decision dealing with a public matter affecting the state as a whole. Best known is the one by which the emperor Charles VI, being without sons, attempted to secure his lands for his daughter Maria Theresa. First put forward in 1713, it was accepted by the diets of his Austrian lands and nearly all the sovereigns of Europe, but when he died it was forgotten, and the War of the Austrian Succession was the result. Other pragmatic sanctions include one issued by Charles VII of France in 1438, ordering the reform of the Gallican Church, and one issued by the emperor Charles V in 1547. See Frederick II.

Pragmatism. Philosophical term of American origin, the idea of which was due to C. S. Pierce, and the first use of the word to William James (*q.v.*). It signifies an empiricism which considers the practical value, the consequences and bearing upon human interests of an assertion or conception, to be the criterion of its truth. See Bergson, H.; Empiricism.



Praetorian Guard, from a bas relief Louvre, Paris

time of Augustus they comprised nine cohorts of 1,000 men each. The Praetorians played a prom-

PRAGUE: CZECHO-SLOVAK CAPITAL

Edgar Stern-Rubarth, Ph.D.

An account of the origin, history, and principal features of the Bohemian city which became the capital of the republic of Czecho-Slovakia in 1918

Prague (Czech, *Praha*), the capital of the Czecho-Slovak republic, lies on the river Vltava (Moldau), 50 m. S. of the Sudeten mts. An important international rly. and air transport centre on the lines Vienna-Berlin, Paris-Stuttgart-Breslau (Wroclaw) - Warsaw, Hamburg-Trieste, etc., Prague has little river traffic. Picturesque in the distribution of the old parts of the city over a number of hills verging on the river, it is one of the most beautiful and homogeneous cities of Europe. Its eight districts are connected by 11 bridges, the most famous of which, the Charles bridge, a Gothic structure with two impressive towers and a row of 30 baroque statues, was designed by Peter Parler and built 1309-1507. From this bridge the huge castle of

Prague, the Hradčany, surmounted by the Gothic cathedral of S. Vitus, can be seen to the best advantage. Founded 1310 as a separate little town by King John I of Bohemia, the Hradčany served later as the palace and court of Bohemian rulers and German emperors.

Prague is predominantly Gothic in style, especially in the rich 14th century remains from its development under the Emperor Charles IV by Matthew of Arras, the architect of S. Vitus, and his successor Parler. S. George's, also in the Hradčany, dates from 912; All Saints was built 1263; and there are also numerous Renaissance and baroque buildings of importance, especially among the palaces of the nobles. The castle, official seat of the Czecho-Slovak president and govt., has 711 rooms, some of them very sumptuous; while the cathedral (1344-1541), erected on the site of a chapel ascribed to S. Wenceslaus (921-929), contains the reliquary of that saint and king, chandeliers



Prague arms



Prague, Czechoslovakia. 1. General view across the Manes bridge over the Vltava river, showing the palace of Hradcany and S. Vitus's cathedral. 2. Statue of King Wenceslaus in front of the National Museum. 3. The Pantheon or national monument of liberation. It contains relics and documents sacred to all Czechs. 4. Vaslavka Street

by Peter Vischer, the Bohemian crown and jewels, and a mausoleum with the silver tomb of S. John of Nepomuk, Bohemia's patron saint, as well as the tombs of S. Wenceslaus and of German and Bohemian rulers.

The Gothic Tyn (Hussite) church (1370-1463) is, next to the cathedral, Prague's most important religious monument; a school of the same name, famous in the Middle Ages, partly covers its façade. It holds the tomb of the astronomer Tycho Brahe (*q.v.*). The Loreto church (1661) with a rich treasure, including a pyx with 6,580 diamonds; S. Thomas's, with an altar painting by Rubens; a Jesuit church of S. Saviour (1578-1602); and S. Nicholas's (1737) are other religious buildings of importance. The renaissance Belvedere palace (1536-52) and the numerous rich palaces and mansions of the Prague nobility—Clam-Gallas, Lobkovitz, Waldstein, Fuerstenberg, Schwarzenberg, Bassevi Czernin, Sylva-Tarouka, Nostiz, etc.—mostly of the 17th and 18th centuries, are outstanding secular buildings.

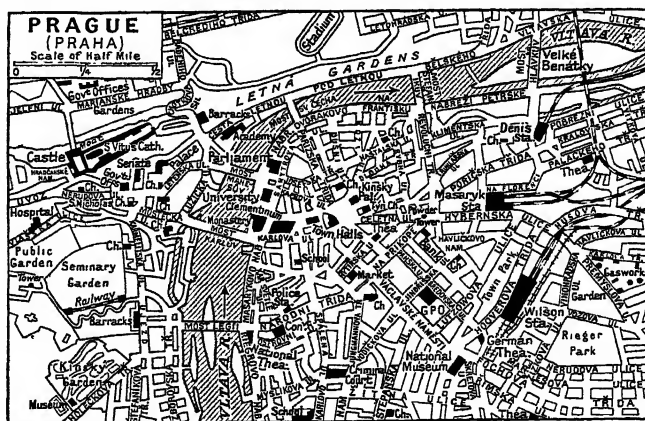
The university, founded by Charles IV in 1348, and the first within the German empire, occupies the Clementinum (1654), a

group of formerly Jesuit buildings which includes colleges, chapels, towers, etc. There are an old powder tower (1475), remnants of a once important ghetto, a Jewish cemetery with famous tombstones and a museum. There were two old town halls one of which, with a famous clock (1381-1490), was one of the few historical buildings destroyed in Prague during the Second Great War.

From 1918, the once royal residence of Bohemia became the

capital of an independent state, and a number of impressive buildings were put up, *e.g.* the national theatre, the Wilson and Masaryk stations, the national museum.

A number of beautiful parks surrounding the historical palaces and mansions are open to the public and offer attractive views, *e.g.* from the formerly fortified Petrin hill, 1,060 ft. high, across the river Vltava. The city has a large stadium, a racecourse, and six theatres.



Prague. Plan of the Bohemian city, capital of the Czechoslovak republic

As the country's economic centre, Prague held 47,000 individual enterprises, about 3,000 of them ranging as industrial plants. They included engineering, automobile, electric, and printing works, food, wagon, textile, chemical, leather, wood, paper, and ceramic factories. It held a fair twice every year. These activities were seriously affected first by the German occupation, 1939-45, and then by a process of nationalisation which began in Oct., 1945, and, following the Communist *coup d'état* of Feb., 1948, was applied to all enterprises employing 50 or more persons.

Prague's intellectual life up to 1918 was bilingual, although even during the 19th century the German element was rapidly diminishing, especially after Prague became the centre of local govt. in 1861; the university was divided into a Czech and a German section in 1882. During 1939-45 the Germans tried to make German culture and the German language once again predominant in Prague; all the changes they introduced were swept away after the Second Great War. Five large libraries (that of the university held 650,000 vols., including 2,444 incunabula and 3,935 MSS.), numerous art galleries and museums, learned societies, etc., contribute to Prague's rôle as a seat of Slavonic culture. Prague is a R.C. archbishopric, a Czech-national bishopric.

History of the City

Founded according to legend by the mythical queen Libusa, Prague was the seat of a bishop from 973, and had German privileged settlements from about 1080. Under Charles IV it was from 1348 capital of the Holy Roman empire. There the great Wycliffite priest, scientist, and Czech martyr John Hus created the first Czech national movement about 1400; the Hussite wars and, after a period of prosperity under King George Podiebrad, the conflicts over the Reformation brought Hapsburg reprisals and, in the Thirty Years' War, great losses for the city. Occupied by the French and Bavarians in 1741, heavily attacked by Frederick of Prussia in 1757 (see Prague, Battle of); occupied 1866 by the Prussians, and seat of the Austro-Prussian peace conference; site of the declaration of Czecho-Slovak independence, Oct. 28, 1918, Prague was occupied by Hitler in March, 1939, and remained in German

hands until May, 1945. As the Allies from E. and W. closed in on Prague, the Czech national committee ordered a rising and seized the city, May 5. The Germans sent tanks against it in an effort to regain control, and the Czechs sent out from the radio station urgent appeals for help to the approaching U.S. and Red armies. Desperate street fighting developed in which some 5,000 civilians were killed, and one of the old town halls was burnt down by the Germans; German bombers attacked the city. The Germans agreed to withdraw from Prague only on May 8, the day the general German surrender was ratified in Berlin. Russian tanks and U.S. infantry entered the city simultaneously May 10, and on May 16 President Benes with the government returned to the capital from Kosice, temporary capital since its liberation by the Russians Jan. 20, where he had been since April 3. Czecho-Slovak institutions were rapidly restored, and the city resumed its normal democratic life until the Communist coup occurred here in Feb., 1948. Pop. (1946) 923,946.

Prague, BATTLE OF. Victory of Frederick the Great in the Seven Years' War, May 6, 1757. The emperor began the campaign of 1757 by marching on Prague, which was held by Charles of Lorraine with some 75,000 Austrians. Attacking the Austrians on their left flank, Frederick ordered a general advance. The battle, fiercely contested, was going against Frederick, when a desperate cavalry charge against the Austrians' wings broke their defence and put them to flight. They retreated into Prague, having lost over 10,000 men and 4,300 prisoners. The Prussian losses were even heavier, but they held the field and laid siege to the city.

Prague, DEFENESTRATION OF. Historical term for two acts of violence at Prague. The first, July 30, 1419, consisted of throwing out of the windows of the town hall two of the new town's councillors, and inaugurated the sanguinary Hussite wars (see Hussites). In the second, May 23, 1618, the imperial statthalters Martinitz and Slavata were thrown by Bohemian Protestants from the windows of the castle, but, falling upon a dung heap, were unharmed; this incident started the Thirty Years' War which swamped the Continent in blood and in many countries virtually wiped out civilization, in particular

leading to the enslavement of the Czech people.

Prah OR **PRA.** River of West Africa, in the Gold Coast Colony. It rises E. of Bompata, flows S.E. on the boundary between Ashanti and the Gold Coast Provinces, and then S. until it falls into the Atlantic Ocean.

Prai OR **KUALA PAI.** Seaport town of Province Wellesley, one of the Straits Settlements, Malaya. It stands on the channel separating the mainland from the island of Penang opposite George Town, and is served by rly. and ferry.

Praia. Capital of the Cape Verde Islands on the S. coast of Santiago I. As a port it handles coffee, medicinal products, hides, fruit, and grain. Cinchona is cultivated. The collapse of a wall on a queue waiting for govt. relief meals caused 232 deaths here, Feb. 2, 1949. Pop. approx. 4,000.

Prain, SIR DAVID (1857-1944). British botanist. Born at Fettercairn, Kincardineshire, July 11, 1857, he was educated at Aberdeen grammar school and university. In 1882, having graduated M.B., he became demonstrator in anatomy to the Edinburgh College of Surgeons. In 1884 he joined the Indian medical service, and two years later was curator of the herbarium and library at the Royal botanic garden, Calcutta. In 1897 he was appointed superintendent and placed in charge of the cultivation of cinchona in India. Director of the Indian botanical survey in 1898, he accompanied Sir Francis Younghusband to Lhasa four years later. In 1905 Prain became director of Kew Gardens, and in 1907 editor of the Botanical Magazine. Retiring from Kew in 1922, he was appointed director of the forest products research board of the department of scientific and industrial research. He was a trustee of the British Museum. Knighted in 1912, he died March 16, 1944.

Prairial. Ninth month in the year as rearranged during the French Revolution. It began on May 20 or 21. The word means the month of meadows.

Prairie (Fr. from Lat. *pratium*, meadow). Temperate natural grassland of the central plains of N. America. In the E. portions, especially in Manitoba and the Red River Valley, enormous quantities of cereals are grown, but in the drier belt nearer the Rockies stock-rearing is more important. The Prairie Provinces of Canada are Manitoba, Saskatchewan, and part of Alberta. See Pasture; Steppe.

Prairie Dog OR PRAIRIE MAR-MOT (*Cynomys ludovicianus*). Rodent found in N. America and allied to the squirrels.

There are three or four other species, all of which live in burrows in the open plains, usually in very extensive colonies. They are about a foot long, and their fur is brown on the back and yellowish white beneath. Their chief foods are grass and roots. They construct before their homes mounds which they use as watchtowers. Many of their burrows are also tenanted by the burrowing owl.

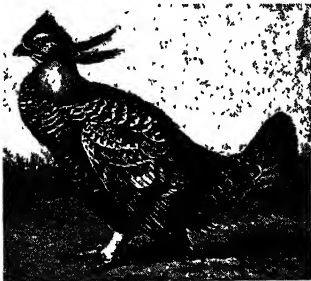
Prairie Hen (*Tympanuchus americanus*). Bird allied to the grouse, native of N. America from the valley of the Mississippi to Ontario. About 19 ins. long, it is brown above, streaked transversely with black and buff; the underside pale brown, with the transverse marks white. The head bears a small white-tipped crest. On each side of the neck of the male is an inflatable orange sac, covered by a tuft of stiff, black feathers. During the breeding season males to the number of 40 or 50 assemble before daybreak in their so-called "scratching places," and go through a performance of display in which low tooting and booming sounds are produced by means of the distended air-sacs, as well as cackling and screams of defiance. These meetings, which last only till sunrise, end in fierce battles. The birds feed on buds, berries, acorns of the scrub oak, and seeds. The flesh of the prairie hen is esteemed as food.

Prajadhipok (1893-1941). King of Siam. Son of King Chulalongkorn, he was born Nov. 8, 1893, and educated at Eton and the R.M.C., Woolwich, adopting an army career. On Nov. 26, 1925, he succeeded his brother Rama VI on the throne. His position became difficult after the revolution of 1932, in which year he granted a new constitution. After a second rebellion in 1934 differences with the government

became acute, Prajadhipok refusing to give up prerogatives. He abdicated March 2, 1935, and was succeeded by his nephew Ananda (1925-46). Spending the rest of his life in England, Prajadhipok died at Virginia Water, May 30, 1941.

Prakrit (Skt., natural, common). General name for the popular languages of India as opposed to the classical Sanskrit (=perfected), of which they are the

direct descendants. Until about A.D. 1000 the Prakrits were divided into four chief dialects: Magadhi (Bihar), Ardha-Magadhi (half-Magadhi, Benares), Apabhramsa (=decadent, valley of the Indus), Sauraseni (between the Ganges and the



Prairie Hen of North America; cock bird of the species

Jumna). These four dialects, which are the source of all the modern vernaculars of India, are related to the ancient Sanskrit as the Romance languages to Latin. The chief source for the knowledge of early Prakrit is the Indian dramas, in which it is used by characters of lower rank. See India.

Pralltriller (Ger.). Musical ornament indicated thus:

and performed as shown below:

In Great Britain it is often called the mordent, which, however, should be played with the lower auxiliary note.

Prasad, RAJENDRA (b. 1884). First president of India. Born in Bihar, Dec. 3, 1884, he went to Presidency College, Calcutta, and became a lawyer. In 1917 he joined Gandhi, and in 1920 gave up his practice to pursue non-cooperation. President of the Indian national congress, 1934 and 1939,

he was several times imprisoned for civil disobedience, and during 1942-45 for infringing the defence of India rules. In 1946 he was in the interim govt., and chairman, later pres., of the constituent assembly; he became first president of the Union of India, 1950.

Praseodymium. One of the cerium family of rare earth metals, forming an almost insoluble potassium sulphate. It is closely associated with neodymium (*q.v.*); indeed they were thought to be one element and called didymium, until in 1885 Welsbach separated them. Praseodymium, chemical symbol Pr, falls in the third long period of the periodic table. It has the atomic number 59; atomic weight, 140.9; melting point, 940° C.; specific gravity, 6.47; crystal forms, alpha-praseodymium hexagonal, beta-praseodymium face-centred cubic, with lattice constant $a=5.151$. The metal may be prepared by electrolysis of the fused chloride and purified by remelting in pure magnesium crucibles under barium chloride. It readily forms a hydride by absorption of hydrogen, but of its various salts none has commercial application. Didymium salicylate antiseptic dressings have been used.

Pratinas. One of the early Greek tragedians. A native of Phlius, in Peloponnesus, not far from Corinth, he was the contemporary of Aeschylus, against whom he competed for the prize at the Dionysia. He is said to have been the first to compose satyric dramas, the only complete extant example of which is the Cyclops of Euripides. The collapse of the wooden seats of the spectators during the performance of one of his plays is said to have led to the erection of stone theatres.

Pratincole (*Glareola*). Genus of birds. They are allied to the sandpipers, but distinguished by their short, curved bill, with wide gape, long, pointed wings, and forked tail. There are 10 species of these small, slender birds that run like plovers and fly like swallows. Best known is the collared pratincole



Pratincole. Collared pratincole, an occasional visitor to Great Britain



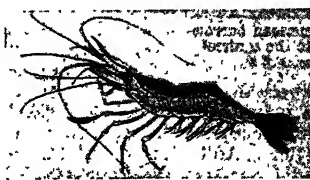
Prajadhipok, King of Siam

(*G. pratincola*) of S. Europe, W. Asia, and N. Africa, whence it migrates to India and S. Africa, and occasionally visits Great Britain. It is brown above, with black and white wings and tail, the breast yellow-brown, and the under parts white with blackish legs. There is a broad patch of dull buff on the throat, outlined with black. The birds frequent sandbanks and coastal lands, feeding upon insects, caught mostly on the wing. Their note is harsh and shrill. See Bird.

Prato. City of Italy, in the prov. of Florence. It stands on the Bisenzio, an affluent of the Arno, 11 m. by rly. N.W. of Florence, and is encompassed by 11th and 14th century walls. The stately marble cathedral, begun in the 12th and finished in the 15th century, has a beautiful external pulpit, from which the Virgin's Girdle is displayed to the faithful; also frescoes and pictures, and bas-reliefs by Della Robbia, who executed medallions for the 15th century early Renaissance Carceri church. There are works by the two Lippis, Agnolo Gaddi, Giovanni Pisano, and other Florentine artists. The chief manufactures are cotton and silk goods, straw, furniture, and

Pravda (Russ., truth). Official daily newspaper of the Russian Communist party. Founded in Vienna in 1912 by Lenin and Bukharin as an underground revolutionary organ, it was later published in Moscow with simultaneous editions in Leningrad and Kuibishev, and in Baku and Rostov the following day. It is nationalistic and devotes little space to non-Russian news. Daily circulation is some 3,000,000.

Prawn (*Leander serratus*). Stalk-eyed crustacean of the order Decapoda. It is common on the British



Prawn. Crustacean common in the shallow waters of the British coast

coasts, particularly where there are submerged rocks in shallow water. About four inches in length, the animal is clad in a translucent, jointed shell of greenish grey, which turns pink when the prawn is cooked for eating. The carapace, covering the combined head and thorax, is extended forwards in a long sword-like rostrum, strongly toothed on its upper and lower edges. There are two pairs of antennae, the inner pair each bearing three long lashes, and the outer pair each with a single lash extending back far beyond the broad tail fan. The first two pairs of legs are armed with pincers.

The prawn swims through the water by means of the six pairs of swimming feet (pleopods) under the hind body; and can dart back suddenly out of danger by spreading the tail and flexing the hind body. It feeds upon the small green seaweeds and the entomostraca that frequent them. Prawns are caught in a small ring-net and in wicker traps of similar formation to lobster pots. See Crustacea.

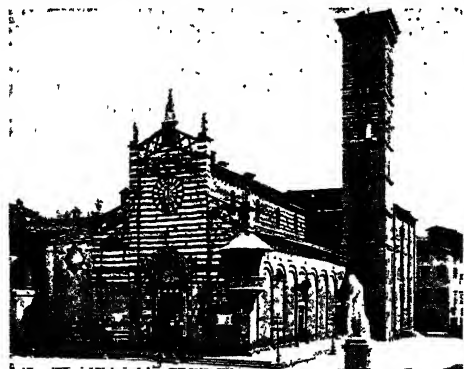
Praxiteles (fl. 360-340 B.C.). Greek sculptor. He worked at Athens, which was probably his birthplace. The only authentic

work by him known to exist is the group of Hermes and Dionysus, discovered 1877, with the base and signature intact, among the ruins of the temple of Hera at Olympia; this is now in the local museum. There are, however, numerous copies of his Aphroditē of Cos and Aphroditē of Chidus, Sleeping Satyr, Apollo the Python-slayer, and other famous statues. He chose beautiful types, but did not idealise unduly; thus his fairest goddesses are essentially human rather than divine figures. *Pron.* Prax-it-el-ez.

Prayer. Term used to denote a request made by an inferior to his superior, and more particularly a request made by man to the supernatural being or beings who form the object of his worship. Prayer in some shape or form is characteristic of every type of religion, from the lowest to the highest. Sometimes it is associated with the use of spells and charms. In Buddhism, prayer-cylinders are inscribed with a sacred formula; by causing these cylinders to revolve, the worshippers are supposed to be able to secure their desires, accumulate merit, and place themselves under the special protection of the deities who form their objects of reverence. In many forms of religion prayer is associated with magical practices.

Prayer may therefore be regarded as one of the most primitive and natural instincts of the human soul. Prayer and religion have always been regarded as inextricably bound up together.

Criticism in modern times has raised two serious objections to prayer. The first is theological. It is urged that God is immutable, and moreover does not need to be told what man needs. The usual answer given to this is: The ability of God to give is conditioned always by the ability of man to receive. Prayer increases the ability to receive, because it induces an attitude of receptivity in the soul, and consequently makes it possible for God to meet the needs of the intercessor. The second is based on scientific grounds. The universe is ruled and governed by immutable laws, which admit of no infraction or interference from without. An answer to prayer would violate the law of uniformity, and so is impossible. The reply to the objection is obvious. Man, by the use of his scientific knowledge, can use and manipulate the laws of nature for his own purposes without in any way violating the law of uniformity.



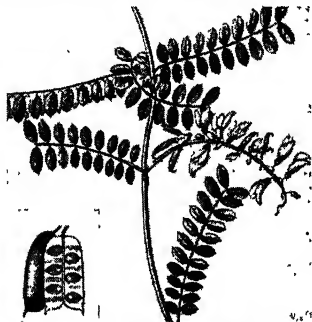
Prato, Italy. Façade and campanile of the cathedral showing the 15th century outdoor pulpit

macaroni. Near by are serpentine quarries. Prato was a republic in the Middle Ages. Pop. 76,559.

During the Second Great War Prato was entered by U.S. troops of the Allied 5th army on Sept. 6, 1944, but was not cleared until the 10th. The church of S. Bartolomeo and the house of Filippo Lippi were demolished by bombs; other buildings were damaged, none very seriously, by shells or bombs. The cathedral itself was only slightly injured, all works of art being intact; the loggia of the cloister was ruined.

Similarly God can answer prayer without violating the laws of nature. See Lord's Prayer.

Prayer Beads OR CRABS'-EYES (*Abrus precatorius*). A climbing plant of the family Leguminosae.



Prayer Beads. Foliage and flowers ;
inset, seeds

It is a native of India. The leaf is divided into two rows of narrow oblong leaflets, and the pea-like, pale purple flowers are in clusters. The oblong pods contain from four to six bright scarlet polished seeds, with a black patch around the scar marking their attachment to the pod. Buddhists thread them to make rosaries; they are also made into necklaces. They are used in India as a standard of weight.

Prayer Book. Authorised service book of the Church of England. Other churches in communion with it, such as the Church of Ireland, the Episcopal Church of Scotland, and the American Church, use basically the same Prayer Book, although their forms differ in some important details.

The Book of Common Prayer is in one sense a product of the Reformation, since it originated from the demand that the public worship of the Church should be in the vernacular; but in another sense it is a product of earlier times, since the materials from which it is compiled are the services of the medieval Church, which themselves developed from the rites of the early Christian centuries. Besides the medieval service books some influence must be attributed to Reformation orders of public worship, in particular to the so-called Consultation of Archbishop Herrmann of Cologne (1543).

The first authorised service in English was the Litany, translated and adopted in 1544 by Cramer. During the same reign of Henry VIII portions of the Mass were also read in English. In the reign of Edward VI the Prayer Book first appeared as a complete order of public worship in the English

language. The chief author of it was Cramer, though he had the assistance of several other bishops. It was, almost certainly, approved by Convocation, and was enforced by parliament in the first Act of Uniformity, 1549. The first Prayer Book did not go far enough in the direction of innovation to satisfy extreme reformers such as Ridley and Hooper, and in 1552 the second Prayer Book was authorised, which went a long way to meet their demands, and represents the nearest approach made by the Church of England to assimilation with the services of the reformed churches of the Continent.

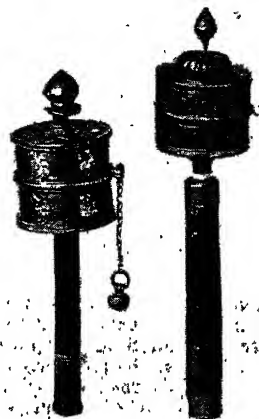
The accession of Elizabeth saw another revision of the Prayer Book, 1559, which restored some details of the first. Under Elizabeth the Prayer Book assumed substantially the form which it still retains, and subsequent alterations have been of minor importance. During the Commonwealth the use of the Prayer Book, whether in public or private, was prohibited, but at the Restoration it became once more the service book of the nation, and in 1661 underwent its last revision. In 1927 and 1928 a revised Prayer Book was accepted by Convocation and the Church Assembly, but was twice rejected by parliament. This book restored even more of the features of the 1549 Prayer Book than did that of 1559, and brought it more closely into line with the American and Scottish books. Some of its features have been sanctioned by some bishops. The Shorter Prayer Book of 1947 simplifies the 1661 book and includes parts of the 1928 revision. See Church of England.

Bibliography. New History of the Book of Common Prayer, F. Procter and W. H. Frere, 4th ed. 1901; The Prayer Book Dictionary, ed. G. Harford, M. Stevenson, and J. W. Tyrer, 1913; The Art of Public Worship, P. Dearmer, 1919; The Background of the Prayer Book, C. S. Phillips, 1938; The Prayer Book of 1928 Reconsidered, W. K. Lowther Clarke, 1943.

Praying Mat OR CARPET. Article used by Mahomedans for kneeling upon when at prayer. About the size of a wide hearthrug, and known as a *seggadeh*, it is marked with a nick, the point of which is turned towards Mecca.

Praying-Wheel. Symbolical instrument used by Buddhists of Tibet in religious exercises. It consists of a cylinder, around which are wound paper bands inscribed with repetitions of the sacred mantra, *om mani padme hum*—O

the Jewel in the Lotus—a form of adoration of the Buddha. The cylinders are made in various sizes, and are turned by hand, or by the agency of wind, water, or fire. The paper used is so thin, and so closely printed are the symbols, that a praying-wheel 8 ft. in height may contain many more than a million repetitions of the mantra. Prayer flags, printed strips of butter muslin tied to poles from 20 to 30 ft. high, are also used.



Praying-Wheel. Two examples of this instrument used by Tibetan Buddhists

See Lamaism; consult The Buddhist Praying-Wheel, W. Simpson, 1896; Lhasa, P. Landon, 1906.

Preaching (Lat. *praedicare*, to proclaim). Public oral appeal on behalf of a religious belief, i.e. the delivery of a sermon. It is intended to convert, or at least exhort, occupies an important place in the history of Christianity, and is practised in other religions. A sermon was formerly called a homily, (*q.v.*) hence the term homiletics.

The apostles of Jesus Christ, notably S. Paul, preached a great deal, as did some of the fathers of the Church; and in the early centuries of the Christian era there were a number of men who combined religious fervour with intellectual distinction and oratorical power. The next group of great preachers were the missionaries, who, from the monasteries of Ireland and Scotland, carried the Christian faith over Europe. The Reformation gave an added importance to preaching, and Luther, Knox, Latimer, and their contemporaries realized the value of an impassioned personal appeal. Hitherto, preaching had not been a regular part of the services of the Church, but Protestants,

especially Nonconformists, soon made the sermon an integral part of divine worship. They, too, stereotyped the plan of basing it on a text taken from the Bible. After the excitement of the Reformation, preaching took a more intellectual tone, marked by the names of Bossuet, Massillon, Jeremy Taylor, South, and others.

Preaching was a feature of the religious revival of the 18th century, as of all religious revivals, Wesley and Whitefield being among the best known of many popular preachers. In the 19th century Spurgeon exercised a remarkable sway by his preaching, while Robertson and Liddon, with their more intellectual appeal, were equally though less apparently successful. Of many other great 19th century preachers may be mentioned Newman, Phillips Brooks, and Lacordaire.

The sermon declined in importance during the 20th century, accompanying not only the general diminution in religious observance but the growing unpopularity and mistrust of all forms of oratory (*q.v.*). Even in the Free Churches the length of a sermon was reduced from the hour or so customary in the 19th century to little over a quarter-hour. The style became less formal, more like that of a friendly chat. But the distinction between preaching to convert and preaching to exhort or expound is still observed, and is well expressed in the jocular saying: "Morning sermon for saints, evening sermon for sinners."

Pre-Adamites. People formerly supposed to have inhabited the world before Adam. Some hold that Adam was the first man of a new creation to take the place of an earlier people who had been exterminated. This view was advocated by Isaac de la Peyrère (1592-1676); his followers were sometimes called Pre-Adamites.

Preamble. An introductory statement at the beginning of an Act of parliament setting out the objects of the legislature in passing the Act. Preambles are now rarely used because modern Acts of parliament are so wide in their scope. The courts in construing a statute will consider the preamble in order to arrive at the intention of the legislature.

Prebend (late Lat. *praebenda*, soldier's rations). Eccles. term for the food, clothing, etc., provided for a clergyman or monk, as distinct from the income of a benefice. Later it came to be used for an endowment provided for the sup-

port of a priest attached to the staff of a cathedral; the holder of the prebend being known as a prebendary. The office of prebendary is now usually a sinecure conferred on a clergyman as a mark of distinction, and the income attached to the dignity is usually nil.

Pre-Cambrian. In geology, name given to the period older than the Cambrian. It is one of great indefiniteness in many ways, and no general classification of it has been accepted by geologists. The term is usually applied to include all those rocks which are of a greater age than those containing the Olenellus fauna of the Cambrian. The rocks are the oldest on the earth, dating from the first formation of a solid crust on the earth's surface down to Cambrian times, and comprise conglomerates, sandstones, greywacke, gneisses, slates, limestones, quartzites, etc. They are usually highly metamorphosed igneous and sedimentary strata which contain few fossils. They are rich in iron and other minerals, like graphite, talc, gold, copper, nickel, etc., and contain valuable building stones, in particular granite and marble. Pre-Cambrian rocks are found widely scattered and often receive local names.

Precedence (Lat. *praecedere*, to go before). Order in which individuals follow each other at state and other ceremonies. It begins with the sovereign or ruler and his family, and is most exactly enforced in monarchical countries. Precedence is determined either by birth or by office. In England the order rests on ancient usage and subsequent regulations as, for instance, the one which in 1905 ranked the prime minister after the archbishop of York. The first of various statutes was passed in 1539, and the regulations, based on letters patent, are issued by the lord chamberlain, assisted by the Herald's College. In Scotland the authority rests with the Lyon court. As regards local authorities in the U.K., no written code has been promulgated, but in the county the lord-lieutenant stands first, followed by the high sheriff.

Order of Precedence of Males in the United Kingdom in 1943.

The Sovereign. Duke of Gloucester. Duke of Windsor. Duke of Edinburgh. Sovereign's nephews. Ambassadors. Archbishop of Canterbury. Lord high chancellor. Archbishop of York. Prime minister. Lord president of the council. Speaker of the house of commons. Lord privy seal (if of baronial rank). Five following state officers (if dukes: (1) Lord great chamberlain (on duty). (2) Earl marshal. (3) Lord steward. (4) Lord chamberlain. (5) Master of the horse. Dukes according to their patents of creation: 1. of England; 2. of Scotland; 3. of Great Britain; 4. of Ireland; 5. Those created since the Union. Ministers

and envoys. Eldest sons of dukes of blood royal. Five above state officers of marquesses. Marquesses, in same order as dukes. Dukes' eldest sons. Five above state officers if earls. Earls, in same order as dukes. Younger sons of dukes of blood royal. Marquesses' eldest sons. Dukes' younger sons. Five above state officers if viscounts. Viscounts, in same order as dukes. Earls' eldest sons. Marquesses' younger sons. Bishops of London, Durham, and Winchester. All other English bishops, according to their seniority of consecration. Five above state officers if barons. Secretaries of state, if barons. Barons, in same order as dukes. Treasurer of H.M. household. Comptroller of H.M. household. Vice-chamberlain of H.M. household. Secretaries of state under the degree of baron. High commissioners. Viscounts' eldest sons. Earls' younger sons. Barons' eldest sons. Knights of the Garter if commoners. Privy councillors if of no higher rank. Chancellor of the exchequer. Chancellor of the duchy of Lancaster. Lord chief justice of England. Master of the rolls. President of the probate court. Lord justices of appeal. Judges of the high court. Viscount's younger sons. Barons' younger sons. Sons of life peers. Baronets of either kingdom, according to date of patents. Knights of the Thistle and S. Patrick if commoners. Members of the various orders as follows: G.C.B., G.C.S.I., G.C.M.G., G.C.I.E., G.C.V.O., G.B.E., K.C.B., K.C.S.I., K.C.M.G., K.C.I.E., G.C.V.O., K.B.E., Knights bachelor. Judicial referees of the supreme court. Judges of county courts and judges of the mayor's and City of London court. Serjeants-at-law. Masters in lunacy. C.B., C.S.I., C.M.G., C.I.E., C.V.O., G.B.E., D.S.O. Members of the 4th class of the R.V.O. Officers of the British Empire. Companions of the I.S.O. Eldest sons of younger sons of peers. Baronets' eldest sons. Eldest sons of knights of the Garter. Eldest sons of knights in order of the fathers. Members of the 5th class R.V.O. Members of the British Empire. Younger sons of the younger sons of peers. Baronets' younger sons. Younger sons of knights in the same order as their fathers. Naval, military, air, and other esquires by office.

Prince Charles (b. 1948) took second place, immediately following the Sovereign.

Precedent. An action or rule which is used as an authoritative example. In law, precedent plays an important part. In order that the course of law may be as certain and regular as possible, the practice has grown up of recording the decisions of judges, particularly on new points, so that these judgements may serve as precedents. A judge of first instance is not, strictly speaking, bound to follow the decisions of another judge of equal rank, but he is bound to follow the judgements of a superior court. The common law of England is to be found almost entirely in the decisions of judges who have expounded the principles whereon it is based. The same observation applies to equity in England. Both the house of lords and the court of appeal are bound by their own decisions. In Scotland also the common law is built upon precedent. See Justice; Law.

Precentor (late Lat. *praecinere*, to sing before). Leader of the singers in the rendering of the musical portion of the service in a cathedral. The term first appeared in the 4th century, when in chanting it became usual for the first half of each verse of the Psalms to

be sung by a precentor or precentors, and for the choir and people to take up the latter half. SS. Basil, Athanasius, and Chrysostom all allude to the custom, and the Apostolic Constitutions order it. In cathedrals of the Church of England, the precentor is usually the chief of the minor canons, and is responsible for the musical arrangements of services. The word was specially used of the leader of praise in Scottish churches before the introduction of organs.

Precept (Lat. *præcipere*, to ordain). Literally a rule or law or order. The word is used specially in England for the written warrant of a magistrate. An order from a local authority for the payment of money to it from the rates is known as a precept. See Rate.

Preceptors, COLLEGE OF. A British educational institution established in 1846 and incorporated by royal charter in 1849. Its policy is to support generally the principle of reasonable independence in education; arrange diploma examinations for teachers (A.C.P., L.C.P., F.C.P.); conduct examinations for schools; provide public lectures; and maintain headquarters in London where teachers from schools of every kind can meet in congenial surroundings. Its journal, *The Educational Times*, is published six times a year. Its headquarters are 2-3, Bloomsbury Square, W.C.1.

Precession. In astronomy, term used in connexion with the movements of the equinoctial points, i.e. the points where the equator intersects the ecliptic. The slow retrograde movement of these points, known as the precession of the equinoxes, is due to the gravitational pull of sun, moon, and planets on the earth's equatorial protuberance. The equinoctial points take 25,800 years to make a complete circuit in the heavens, and the effect of the movement is to change the position of the celestial poles and alter the signs of the zodiac relative to those of the ecliptic. The first sign of the zodiac, for example, is no longer in the constellation Aries, but in Pisces. The precession of the equinoxes was discovered by Hipparchus about 130 B.C. See Equinox; Nutation.

Précieuses Ridicules, LES. Farcical one-act comedy by Molière, produced at the Petit-Bourbon, Paris, 1659, when Molière played the part of Mascarille. Molière's first essay in contemporary satire, it was directed at the imitators of the learned, if

affected, coterie of the Hôtel Rambouillet. The *précieuses* had kindred spirits in other countries, e.g. the euphuists in England. The ridiculous euphuists of the title are two provincial belles who reject the advances of their suitors because the latter do not make love according to the novels of Mlle. de Soudéry.

Precious Stones. Names given to kinds of natural rock which, from their beauty of colour and translucence when polished and cut, have been accorded high value by mankind. Precious stones (except the opal) are crystalline in character.

The chief precious stones are: *Andalusite*, olive green or sad brown, from Spain, Brazil, Ceylon, Siberia; *Apatite*, white, blue, violet, green, yellow, from Europe, India, the Americas; *Beryl*—Emerald, green, Morcanite, pink, Heliodor, golden, Aquamarine, blue, of world-wide distribution; *Diamond*, all colours, from Africa, India, Borneo, Brazil, Australia; *Corundum*—Ruby, red, Sapphire, all colours, found all over the world; *Chrysoberyl*—Cat's Eye, yellow, brown, and green, from Russia, Alexandrite, green to red, from Ceylon; *Topaz*, all colours, found all over the world; *Opal*, all colours, found nearly everywhere; *Zircon*, all colours, from Ceylon; *Spodumene*, pink or green, from N. America.

Semi-precious stones are: *Spinel*, all colours, from Asia; *Tourmaline*, all colours, found all over the world; *Garnet*, reds, browns, greens, yellows, orange, found all over the world—Demantoid, green, from Russia; *Quartz*, all colours—Citrine, yellow, Amethyst, purple, found all over the world; *Turquoise*, blue, from Persia; *Jade*, all colours, nearly world wide—the best from Burma; *Lapis Lazuli*, blue, from Afghanistan.

The qualities that determine their relative status are brilliancy, colour, hardness. Rarity has little to do with the price and saleability of precious stones. Diamonds are not uncommon, as an inspection of any jeweller's stock will reveal, but their exceptional brilliancy allied to their great degree of hardness has made them since the beginning of the Christian era the most valuable of all human possessions. The De Beers and Kimberley mines produced over 38 million carats of diamonds in 25 years, and there are at least 30 diamonds on record that have weighed more than 400 carats each; yet on June 10, 1948, one

diamond weighing less than eleven carats was purchased by a London firm of jewellers at auction for £9,000. More than 90 p.c. of the money expended on precious stones is spent on diamonds.

Exceptional specimens of ruby or emerald command as high a price as diamonds; but stones of ordinary quality bring much less than comparable diamonds.

The asterias stone is a form of corundum that shows when polished *en cabochon* a six-rayed star of light caused by minute tubular cavities that trap the light; these stones are generally called star rubies and star sapphires; blue and red ones of a pronounced colour and distinctively marked are very scarce, the majority being of a dull greyish tint and imperfectly starred.

Most diamonds are cut in brilliant fashion, circular with 58, sometimes 88, facets. Coloured stones are usually cut in rectangular shapes, sometimes with the corners cut off; this cutting is occasionally applied to diamonds, when it reveals the pellucidity of the stone, but removes a great deal of the fire and brilliance. At one time many diamonds were rose cut, i.e. with many facets on the upper surface and flat at the base, very suitable for the covered-in settings of the 18th century. Some stones, particularly carbuncles and turquoise, are polished *en cabochon* without facets; carbuncles frequently have the base hollowed out to permit the light to pass through the stone with greater ease.

The caves of Kentucky produce a natural pearl by the slow deposits of stalactites. Although these are of gem quality, they are so scarce that only collectors purchase them.

Amber and coral are two other organic substances used for adornment, the former a fossil gum, the latter the skeleton of the coral polyp; the value of both these lies in the fashioning rather than the material.

BIRTH STONES. Many stones are believed to be fortunate for certain wearers, the natal stones being worn all over the world. The list usually accepted in England is: Jan., garnet; Feb., amethyst; March, aquamarine; April, diamond; May, emerald; June, pearl; July, ruby; Aug., peridot; Sept., sapphire (blue); Oct., opal; Nov., topaz; Dec., turquoise. See colour plate facing p. 6680; also Jewelry; Pearl.

R. H. Granville Clarke

Precipitation (Lat. *praecipitare*, to throw headlong). Term used in meteorology to denote any aqueous deposit, in liquid or solid form, derived from the atmosphere. The deposit may occur as rain, snow, hail, dew, or hoar frost. Rain and dew are collected in a rain gauge. The depth of snow can also be estimated, a foot of snow being taken as roughly equal to an inch of rain; the latter over an acre of ground has the volume of about 101 tons of water. (See Rainfall; Weather.)

Chemical precipitation is the process of separating solid particles from a solution by adding a chemical substance. For example, if a solution of sodium carbonate is added to one of calcium chloride, calcium carbonate in the form of a white precipitate results. Many methods of testing employed in chemical analysis depend upon the formation of precipitates of distinctive appearances.

Précis-Writing (Fr.; Lat. *praecisus*, cut short). Process of extracting in condensed, yet easily intelligible, form the essential facts or statements contained in a letter, dispatch, or other document. Précis-writing forms an examination subject for many govt. depts. and is particularly used in foreign office and diplomatic work.

Precognition. Term applied in Scots law to the preliminary examination of witnesses to be called in a criminal case, usually by the procurator-fiscal and before a judge, justice, or sheriff, to determine whether there is ground for trial. The word is also used less correctly of any antecedent examination of witnesses by solicitors or counsel before their examination in court, and of the written statement, or proof, of their evidence.

Predestination. Term used in Christian theology to denote the act of God in determining the destiny of individuals and peoples. The doctrine of predestination corresponds to the belief in fate which is found in some form or other in most religions—though sharply differentiated from it by the Christian conception of God.

The term is used in several senses, to denote (1) the eternal purpose of God, which was predetermined before the creation of the world; (2) the selection of certain nations or individuals for the performance of specific tasks in connexion with the realization of this purpose; (3) the selection of individuals as subjects for the exercise of Divine grace and the

inheritance of eternal life. It is in the third sense that the term is most commonly used. The doctrine was first formulated by S. Augustine, who defines predestination as the "unconditional decree, according to which God determines to select from the fallen mass of mankind, the whole of whom are alike guilty and under condemnation, a portion upon whom he bestows renewing grace."

S. Augustine never carried the doctrine to its logical conclusion. Predestination simply affected those who were selected for redemption. It was not till the 11th century that through the influence of Gottschalk the reprobation of the wicked was included in the scheme of predestination. The Biblical data upon which the theory is based are found mainly in the Pauline Epistles, and especially in Romans 8, vv. 29-30, and chaps. 9-11, though it is doubtful whether the words used by Paul will bear the construction placed upon them, and it is quite certain that the Apostle laid the utmost stress on human responsibility and the freedom of the will. See Augustine; Calvin; Calvinism.

Predicable (Lat. *praedicare*, to declare). In logic, that which can be predicted or affirmed of something. Aristotle distributed the predicables under four heads: property (the quality common to the whole of a class, but not necessary to distinguish it from other classes), definition, genus, accident (a quality which is not essential to the conception of a substance). These were increased by later logicians to five; genus, species, property, accident, difference (a characteristic mark distinguishing a thing from all others in the same class), difference being added, and species taking the place of definition. The question of the reality or non-reality of these predicables subsequently led to the dispute about universals (*q.v.*).

Predicate. Word or words expressing what is affirmed or denied of the subject of a sentence. If the predicate comes between subject and object, it will consist of a verb alone, but if there is no object the predicate may complete a statement; thus, in the sentence, "he is working cheerfully," all words except "he" are part of the predicate. In logic, the term means an attribute inherent in the subject under discussion, *e.g.* flatness is a predicate of all flat objects.

Predictor. Optical device for mechanically establishing a future position of a moving object. Pre-

dictors are used in astronomy for checking mathematical data relative to progression of the moving heavenly bodies; but their principal application is in anti-aircraft gunnery, which involves a number of factors absent in ground to ground firing. The target moves rapidly at varying heights, may change direction in a few seconds, and moves in three dimensions. Also the wind may cause the shell to drift during its flight, and there is a time lapse between the moment of firing and the moment of impact. An aircraft flying at 300 m.p.h. moves 444 ft. a second; consequently the gun must be laid in advance of the target's course.

All these factors may be calculated mathematically from tables, and the point of aim fixed; but when done by a human being the result is arrived at too late for the gun to open effective fire. The predictor, a combination of optical instruments and a calculating machine, mechanically interprets such data as height, speed, and direction of target into elevation and direction for the gun, and indicates the timing of the shell fuse. The calculations are solved continuously and transmitted to the gunlayers in 1/100th of the time necessary for human calculations.

The predictor consists of a box containing a range finder and a height finder, for each of which there is an eyepiece and telescope sight. Across the lens of each finder are two hairlines meeting at right angles. When the aircraft is picked up by both finders, the operator at each eyepiece turns a knob until the target has been brought across the intersection of the lines; the angle between observer and target, and the passage of the target across a grid of fine wires, are shown on indicators. Simultaneously, a drift recorder establishes strength and direction of wind. These factors are automatically and rapidly transmitted to the gun, where mechanical pointers moving across dials show bearing and elevation, allowance for wind drift, and the setting for the fuse. Fuse setting is thus automatic. A machine actuated by the predictor sets the fuse at the required range, rams the shell in the barrel, and closes the breech in a matter of seconds. In directing the fire of guns from a fixed site, the actual elevation and traversing gears, fuse setting machine, and firing mechanism are controlled directly by the predictor operators, and the guns ranged and fired without intervention by the gun crew. On

mobile A.A. guns, the predictor operators' dials are electrically connected to pointers geared to the gun. The defect of the predictor is that it cannot automatically allow for any deflection of the aircraft from a steady course. This is of little importance when dealing with bombers, as such aircraft must keep a set course when making their bomb run.

Predil. Mt. pass of the Carnic Alps, on the Italian-Yugoslav border. Between Tarvis, in Udine prov., and Flitsch, in Gorizia, its maximum altitude is 3,810 ft.

Preece, Sir William Henry (1834-1913). Welsh electrical engineer. Born in Carnarvon, Feb.

15, 1834, he became associated with the Electric and International Telegraph Co., 1853; was engineer to the Channel Islands Telegraph Co., 1858-62; and divisional engineer to the



Sir W. H. Preece,
British electrical
engineer
Russell

post office from 1870, engineer in chief, 1892-99, and afterwards consulting engineer to the post office and colonies. Preece carried out pioneer electrical work in wireless and wrote on telegraphy and telephony. He was knighted in 1899, and died Nov. 6, 1913.

Pready, GEORGE. One of the pen-names of the British novelist Marjorie Bowen (*q.v.*).

Pre-emption (Lat. *prae*, before; *emere*, to buy). In English law, the right of having the first choice to buy a thing. Before the Restoration the royal purveyors had this right in respect of food, etc., required by the king and his court when travelling in the country, but it was abolished by the Act 12 Charles II, c. 24, which did away with feudal rights. Under the Lands Clauses Acts, if an authority which has purchased lands compulsorily has taken more than it requires, before selling it on the market it must give the pre-emption to the former owner from whom it was compulsorily acquired. In international law, the word means the right of purchasing instead of confiscating contraband of war, or such articles which, though not usually contraband, are declared so owing to special circumstances.

Pre-existence. Doctrine that the soul exists before it is united with the body. It seems to have

originated in the East and underlies the caste system of India, which maintains that the social position into which a man is born indicates his merits or demerits in a previous existence. A further, more corrupt development of the idea is seen in the doctrine of the transmigration of souls. According to Plato the soul originally existed in a state of ideal perfection, but, falling short of the ideal, is condemned to enter a material body subject to decay, from which it can only gain release by self-purification and self-mortification. The Alexandrian School among the Jews embraced a similar theory, which found its way into the Christian Church, but was rejected by the council of Constantinople. According to this view, all souls were created together at the first with the soul of Adam, and remain in the keeping of God until the time comes when they are destined to be united with a body. This teaching has no foundation in Scripture, but is not considered heretical. See Creationism.

Prefabrication. Mass manufacture of components, later assembled into a finished article. Prefabrication developed from the Scandinavian practice of manufacturing doors and window frames in the forests where the timber was cut, and then sending them ready assembled to the house-builder. It was adopted on a large scale by motor vehicle manufacturers in the 1930s. Radiators, wings, chassis frames, electrical equipment, and bodies were made in separate factories and then assembled at a central plant. During the Second Great War, prefabrication was used in the production of tanks, artillery, and aircraft, and in the U.K.

enabled factories to be dispersed as an air-raid protection. In the U.S.A. ships were prefabricated (*see* Liberty Ship). One of the largest single prefabricated undertakings was the Mulberry Harbour (*q.v.*) used in the Allied invasion of Europe. To relieve the housing shortage existing after the Second Great War, prefabrication of houses was largely developed. Many of these were of aluminium, being manufactured in former aircraft factories. *See* Building; House; Mass Production; Shipbuilding.

Prefect (Lat. *praefectus*, set in command). Generally, one who is in a position of authority over others. In ancient Rome the praefect (*q.v.*) was an important official. In France the prefect (*préfet*) is the chief administrative officer of each department, his seat (*préfecture*) being in the chief town of his department, and the prefect of police is chief of the police of Paris and the Seine dept. In English public schools, a prefect is a senior boy who is responsible for maintaining discipline in a house or dormitory, and often has powers of inflicting punishment for minor offences, and the services of a "fag"; the titles praeposter and monitor are also used in this connexion.

Preference. Political term for a system of preferential tariffs. *See* Imperial Preference; Tariff.

Preference Share. Share in a limited company entitling the holder to preference, compared with the holder of ordinary shares, in regard to dividend and, usually, repayment in the event of dissolution. The dividend is fixed, but some participation in the general profits may also be provided for, and dividends may be cumulative or non-cumulative. Preference



Prefabrication. During and after the Second Great War extensive use was made of prefabricated houses of metal, timber, or stone-like composition. These shown in the foreground are at Carr Estate, York

shares may be redeemable or irredeemable, and the classes may be combined, as in cumulative participating redeemable preference shares.

Pregl, Fritz (1869-1930). Austrian chemist, born Sept. 3, 1869, at Laibach (Ljubljana). At Graz he started his career as assistant professor in 1903; after holding the chair of chemistry at Innsbruck, 1910-13, he went back to Graz, and died there Dec. 13, 1930. He became world-famous by devising methods of quantitative micro-analysis whereby the smallest amounts of matter permit an exact chemical analysis. His micro-balance is in general use; so is the iodine solution he developed as a general disinfectant, which bears his name. He won the Nobel prize for chemistry in 1923.

Pregnancy. Period from the time of conception to the birth of an animal. In the human species the average duration of this period is 280 days, reckoned from the first day of the last menstrual period.

Cessation of the menstrual flow is the first indication that a woman is pregnant, but is not conclusive, since it may be due to other causes. Morning sickness usually occurs in the second month and becomes more marked in the third, fourth, and fifth. There may be nausea alone, particularly when first waking in the morning, or actual vomiting, and sometimes this occurs frequently during the day, and becomes a distressing symptom. Its cause is unknown. Changes in the breast may be noticed during the second month, the breast becoming enlarged and the superficial veins more prominent. During succeeding months the nipples become enlarged, small raised follicles develop around them, and the pigmentation on the surrounding skin is darker. From the beginning of the third month generally a little mucoid secretion can be squeezed out of the breasts. Quickening, the term applied to the sensation experienced by the mother when she first feels the movements of the foetus within her, generally occurs in the fourth or fifth month. Enlargement of the uterus may be recognized by the physician in the second or third month. During the fifth month, the foetal heart beat becomes audible through the stethoscope.

Pregnancy is a natural condition and the expectant mother should not regard herself as an invalid during the period of gestation.

Any form of excess or undue exertion should be avoided, but otherwise she should depart as little as possible from a normal life. Plenty of fresh air is important, and regular exercise should be taken, walking being the best form. A normal and nourishing diet should be taken. Excitement or mental distress should be avoided, and any sudden shock or fright is dangerous, as it may cause a miscarriage. If the breasts are painful and heavy, they may be supported by bandages, and during the last three months the nipples should be hardened by bathing them daily with spirit and water.

Spurious pregnancy, or pseudocyesis, is a condition of imaginary pregnancy occasionally seen in hysterical women, particularly those who have reason to fear pregnancy or who are very anxious to have children. In this condition menstruation may cease, mammary changes occur, the abdomen enlarge (though it is only distended with gas), and the woman may assert that she feels the foetal movements. The symptoms generally disappear after the patient has been reassured by the physician regarding her condition. *See* Gestation; Menstruation.

Prehistoric. Antecedent to recorded history. That branch of the study of the human past which concerns prehistoric times as revealed by archaeology is sometimes called prehistory.

Since the word was first used in 1851 by Daniel Wilson, when recording Scotland's prehistoric annals, its scope has been greatly modified. Pictorial, monumental, and other intentional records of events antecedent to writing hold an important place in recorded history. When history implies the whole past, whether known and narrated or not, prehistory loses its meaning altogether.

The beginning of human history was not the same everywhere. In the stricter sense prehistoric Egypt crossed the threshold of history with the 1st dynasty of Men. For millenniums afterwards Europe remained in its prehistoric age, and prehistoric Britain is usually bounded by the advent of Julius Caesar. In one sense America was prehistoric until Columbus's arrival in 1492, if that of the Norsemen in 1000 be disregarded. But in view of our substantial knowledge of several centuries of Maya and Inca history, pre-Columbian is the more appropriate term.

Recorded history is sometimes held to begin with the Magdalenian

cave-pictures of France and Spain. Hence Duckworth ends his Prehistoric Man with the preceding Aurignacian period. The term is extended into prehuman or geologic time, as when Mesozoic reptiles are spoken of as prehistoric monsters. When the earth's history is said to be written in "the record of the rocks," its prehistory recedes into the remotest past, before any solid crust was formed. *See* Archaeology; Stone Age.

Prehnite. One of the zeolite group of minerals; chemically a hydrated calcium and aluminium silicate. A glassy white to light green in colour, it is often a secondary mineral in eruptive rocks, and is derived from the decomposition of feldspar; also found in some amphibolites and crystalline limestones. It resembles chrysoprase when cut and polished, and is often used as a gemstone or as an ornamental stone. *See* Zeolite.

Prelate (Lat. *praelatus*, placed over). Ecclesiastical term for one having episcopal authority, e.g. an archbishop or bishop. *See* Archbishop; Bishop; Ecclesiastical Law.

Prelude (Lat. *prae*, before; *ludus*, a play). Musical piece played before a church service, the opposite of postlude. This ecclesiastical use, however, is no longer the commonest. Bach wrote 48 preludes and fugues for organ which are pieces for performance in their own right; there are preludes as introductory pieces to plays and operas, e.g. in Wagner's *Master-singers*; and with Chopin the prelude is a composition to suit a virtuosic pianist. The Prelude is the title of one of Wordsworth's longest poems.

Premature Birth. Birth of a child before complete intra-uterine development has been reached, and after the 28th week of pregnancy, i.e. the period at which the child has become viable or capable of surviving. The most common causes of premature birth are syphilis in either parent; serious constitutional disease in the mother, such as Bright's disease, lead poisoning, and heart disease; localised disease of the uterus; mental shock or excitement and violence, e.g. a fall or strenuous exercise. A prematurely born child demands special care and skill in order that it may be reared and thrive. Hospitals place such infants in incubators. If the necessary attention is given, many such children become eventually quite as vigorous and well-developed as those whose gestation has been normal.

Premature Burial. Interment before life is extinct. Many persons have a morbid fear of being buried alive. In countries where some days are allowed to elapse between death and burial, thus giving time for the appearance of the undoubted signs of death, there is no fear of such an accident. A few cases have been recorded, but always in exceptional circumstances, usually during epidemics of cholera or plague in hot countries, when fear of infection has led to hasty burial without proper examination by a physician. The Premature Burial is the title of a short story by Poe.

Premium (Lat. *præ*, above; *emere*, to buy). Literally a prize or reward. As a financial term it implies something above the nominal or fixed price. Thus, shares at a premium are worth more than their nominal value, e.g., when £100 of stock is at £110, it is at a premium of £10. The opposite of premium in this sense is discount (*q.v.*). A sum paid by a prospective tenant to secure tenancy of a house is also called a premium. Under the Rent Restriction Acts it is illegal for a landlord to demand a premium except in a lease of 14 years or over. The term is used also for periodical payments to an insurance company in respect of a policy of insurance (*q.v.*).

Premium Bond. Document under seal, in which the borrower undertakes to repay a loan at a premium, i.e. to repay more than £100 for each £100 originally lent. This device is common as an inducement to investors. Thus, a company may offer at £99 p.c. £200,000 4 p.c. Debenture Bonds redeemable 15 years hence at £105; this means that an investor receives for every £99 supplied to the company the right to be paid £4 in interest each year for 15 years, and finally to receive in repayment £105, the extra £5 sometimes being called the premium on redemption.

Premonstratensians or NORBERTINES. Order of regular canons founded in 1120 by S. Norbert of Cleves, afterwards archbishop of Magdeburg. They are named from their first abode near Laon, Prémontré, the "meadow shown," or the "place foreshown" to the founder in a vision. The order follows the Augustinian rule, and was very powerful in N. Europe before the Reformation. It has houses for women as well as men. In England, where Welbeck Abbey was their chief house, the Premonstratensians were known as White Canons. The order has

been revived at Storrington, Sussex, and in France.

Prempeh I (d. 1931). King of Ashanti, 1886-96. Chosen to rule after a civil war in March, 1886,



Prempeh I,
King of Ashanti
From a sketch by Lord
Baden-Powell, by cour-
tesy of Methuen & Co.,
Ltd.

Premphe took the name of Kwakwada III. His election was favoured by the British, and he had some prosperous years of rule. About 1893, however, he began to ignore the terms of the treaty of 1874 with Great Britain, and, after vain negotiations, a war began which ended in his seizure and dethronement. Prempeh was detained as a political prisoner, first at Elmina and later in the Seychelles. In 1924 he was allowed to return to Ashanti, and in 1926 was chosen chief of the Kumasi div. He died May 12, 1931.

His nephew, Otumfuo Sir Osei Agyeman (b. 1892), known as Prempeh II, succeeded to the chieftainship and became head of the Ashanti confederation on its revival in 1935. He was knighted in 1937.

Prensa, La (The Press). Daily newspaper, established in Buenos Aires in 1869, by Dr. José Paz, who was succeeded by his son, E. P. Paz. At first a four-page paper, it has given for many years 20 to 30 pages daily. It has the largest circulation of any newspaper in S. America, and is the best known of the many newspapers of the same name.

Prenzlau. Town of the Land of Brandenburg, in E. Germany. It stands at the N. end of Lake Ucker, 68 m. N.N.E. of Berlin. The chief building is the Gothic church of S. Mary (14th century). Among the industries normally are the manufacture of cigars, sugar refining, and brewing. Prenzlau, which became a town in 1234, was made the capital of the Uckermark, and was fortified about that time. There are remains of its walls and towers. In 1250 it became part of Brandenburg. In Oct., 1806, 12,000 Prussians surrendered here to Murat. Captured by Marshal Rokossovsky's 2nd White Russian army, April 27, 1945, the town lay after Germany's surrender in the Russian zone of occupation. Pop. 28,000.

Preposition (Lat. *præponere*, to place before). In grammar, an indeclinable part of speech preceding a noun or pronoun in a case other than the nominative. It serves to define the relation of such noun or pronoun to some other element of the sentence. Prepositions are really adverbs, and it is incorrect to speak of prepositions "governing" certain cases. At first the meaning which it was desired to express resided in the case itself, but as the case-suffix lost force, an adverb was added to strengthen it. The term preposition is not altogether correct. In earlier times it was sometimes a postposition, placed after the noun, as it is now in many languages. As a language passes from the synthetic to the analytic stage, the need for prepositions increases. Thus, the dative *magistro* in Latin requires in English three words, to the master.

Pre-Raphaelite Brotherhood. Name adopted in 1848-49 by a group of British artists, of whom



Pre-Raphaelite Brotherhood. Millais' picture of Christ in the House of His Parents, execrated when shown in 1850, now in the Tate Gallery. See text

the leading spirits were W. Holman Hunt, J. E. Millais, and D. G. Rossetti, aged respectively 21, 19, and 20. In enthusiastic active revolt against the academic standards then prevalent in British painting—their password was “Death to sloth!”—they set themselves to lead a return to the simpler ideals of the Italian painters, which implied, in their view, a sincere transcription of natural appearances such as academic painters were neglecting in their subservience to convention. The Pre-Raphaelites tended to choose literary or scriptural subjects, and other characteristics were unusually vivid colour and a careful attention to minute and accurate detail. Their first paintings attracted little attention, but works exhibited in 1850, including especially Millais’ Christ in the House of His Parents, now in the Tate Gallery, aroused the ire and scorn of the critics, who had now perceived the calculated audacity of the revolt. There were many protests from the public, especially against Millais’ work, led by a savagely satirical article by Dickens in *Household Words*. This was not without its effect on the Brotherhood, which thereafter began to disintegrate. But Ruskin’s generous support of their work encouraged Hunt and Millais to persist in their particular style, Millais for some years, Hunt for the rest of his life; and other painters followed them in sufficient numbers to gain public acceptance and eventually to outlive the earlier formulae against which the Brotherhood had revolted. Rossetti developed a romantic literary style of his own, which was also widely followed by other painters, notably Burne-Jones who invested medieval subjects with a distinctive romantic formalism, and through the early connexion of Rossetti with the P.R.B., this style was also erroneously termed Pre-Raphaelite.

Besides the three artists mentioned, the only other members of the Brotherhood were W. M. Rossetti (writer), T. Woolner (sculptor), F. G. Stephens (writer), and J. Collinson (painter). Two issues of a periodical, *The Germ*, edited by W. M. Rossetti, were issued by the Brotherhood in 1850, to publicise and exercise their ideals. See Hunt, W. Holman; Millais, J. E.; Rossetti, D. G. *Consult* Pre-Raphaelitism and the P.R.B., W. Holman Hunt, 1905; *The Pre-Raphaelite Tragedy*, W. Gaunt, 1942.

Prerogative (Lat. *praerogare*, to ask before). In general, an exclusive right or privilege belonging to a person or body in virtue of his or its status or character. Thus the royal prerogative is the rights claimed to be inherent in the crown, either as established by historic custom, or as given by direct gift of God. The divine origin of prerogatives, as claimed by the Stuarts, was an important issue in the political philosophy of the 17th and 18th centuries. At the present day the royal prerogative includes such powers as those of declaring war, summoning and dismissing parliament, creating peers, and pardoning offenders. In theory, the royal prerogative has an extremely wide range of power, but in practice it is exercised only through the privy council or the cabinet. The crown enjoys many personal rights and privileges by prerogative, such as personal irresponsibility for crime, exemption from taxation, etc.

Prerogative writs and orders are in the nature of commands for the better execution of justice or the protection of the liberty of the subject, issued by order of the judges of the court of king’s bench. The principal ones are Habeas Corpus, Mandamus, Certiorari, and Quo Warranto. See

Divine Right; King; Petition of Right; Writ.

Prerov or **PRERAU**. A town in Czecho-Slovakia. In the Moravian division, it is 15 m. S.E. of Olomouc (Olmütz). It contains a Gothic town hall and an old castle once the residence of King Matthias Corvinus, and has manufactures of woollens, beet sugar, and farm implements. Prerov was formerly the headquarters of the Moravian Brethren. Pop. 22,362.

Presanella. Mt. mass in the Trentino, Italy. It is situated N.E. of Monte Adamello (*q.v.*) and reaches an alt. of 11,690 ft. It was first ascended by Freshfield in 1864.

Presbyopia (Gr. *presbys*, old man; *ops*, eye). Diminution in the power of focusing the eye, owing to advancing age. Near objects must be held increasingly farther from the eye in order to be seen distinctly. The condition is corrected by wearing convex glasses. See Eye; Sight.

Presbyter (Gr. *presbyteros*, elder). Alternative name for an elder of the early Christian Church, the principal official of a Jewish synagogue, and for a member of the Sanhedrin. In the Presbyterian churches it is applied to a member of a presbytery and to a ruling elder.

PRESBYTERIANISM: ORIGIN & POLITY

* Rev. A. D. HARCUS, D.D., Gen. Sec. Presbyterian C. of Eng.

In connexion with this subject see the articles Calvinism; Church of Scotland; Dutch Church; Huguenots; Protestantism; Reformation. See also the article Christianity and those on the various branches of Christianity; and biographies of Knox and other leaders of Presbyterianism.

Presbyterianism is the name for the organization of the Christian Church on the basis of rule by presbyters. These are chosen by the congregations and set apart for their twofold duties of teaching and ruling, the former office, which includes the administration of the sacraments, corresponding to the clerical, the latter to the lay element in other churches. The presbyters are equal in rank, electing temporary moderators or presidents from their own number in the presbyteries, sessions, and general assemblies, which form the three church courts.

Thus the three notes of Presbyterianism are: the parity of the clergy, in distinction from the episcopal system or the papal; the right of the congregation to govern itself by means of office-bearers chosen from its own members—a primitive right which was only taken gradually from the early Church; and the avoidance

of congregational individualism by means of administrative unity secured in the church courts, where the presbyters sit as representatives of their various congregations. The presbyters are not mere delegates, however; they are ordained for life, whether as ministers or as ruling elders.

When the Reformation broke up the monarchical idea of church polity which had been developed in the Middle Ages, the attempt to express the functions of a Christian church in polity led Calvin to organize the Genevan church on a presbyterian basis. Wherever the reformed church found itself in a monarchy, the tendency was to conserve the episcopal polity in a more or less modified form, as in the English and the Scandinavian churches. But where the Church had to assert its independence against the civil authorities, as in France, the Netherlands, and Scotland, the presbyterian polity

proved more effective; it secured for the congregation their right of self-government, although it is a mistake to identify this instinct off-hand with any modern democratic tendency; it also safeguarded the Church against anything like sacerdotalism. In insisting that the jurisdiction of the Church must be in the hands of the Church, Presbyterianism also insisted that the Church was not simply the clergy.

Questions of Divine Right

From the 17th century onwards a hot controversy raged upon the divine right of episcopacy or presbytery, which is only ceasing in our own day as historical scholarship intervenes to prove that originally the conditions of the Church held both elements together, that neither can claim more than validity on the basis of practical convenience, and that the development in the 2nd century, which led ultimately to the mediæval system of bishops and cardinals, derived from political exigencies which no longer exist, or from doctrinal movements which are open to question. All that Presbyterianism, or any other form of polity, can claim is that it suits the genius of the Church and conserves its practical ends, that it guarantees whatever is requisite to the well-being and efficiency of the Church as God's people.

Historically it is justified by its success. Even in England, as Matthew Arnold pointed out, Hooker wrote his great treatise "not because episcopalianism is essential, but because its impugnors maintained that Presbyterianism is essential, and that episcopalianism is sinful. Neither the one nor the other is essential or sinful, and much may be said on behalf of both. But what is important to be remarked is, that *both were in the Church of England at the Reformation, and that Presbyterianism was only extruded gradually.*"

The opposite process took place in Scotland, and it was largely due to Scottish settlers that Presbyterianism spread rapidly in Ireland from the 17th century onwards, whereas the Presbyterian Church in Wales owed its origin to English impetus in the 18th century.

Huguenots and Calvin

On the Continent, the French Huguenots naturally followed Calvin, though they organized their presbyterian polity on slightly different lines. East of the Rhine, political conditions hindered the presbyterian polity, but Bohemia,

even before Calvin, had developed a semi-presbyterian system. and the remarkable church of Hungary, with over half a million members, attests the vigour of the presbyterian system and its appeal to the reformed Christians of that country. Together with the scattered and smaller communities, which are thus organized elsewhere upon the Continent, the Dutch, British, French, Swiss, and Hungarian Presbyterians now number about five millions, and the polity has proved itself flexible enough to live and thrive amidst complex modern environments.

In Canada the first presbyterian movement was made by the Huguenots in the 17th century. The ill-judged policy of France, which reserved Canada for the Roman Church, checked this attempt. But during the next century the British immigrants took up the cause, and in the eastern and western provinces the Presbyterians were numerically second only to the Methodists. A union between Methodists, Congregationalists, and Presbyterians formed the United Church of Canada, but many Presbyterians remained outside. Strong Presbyterian churches have also been formed, principally through Scottish and Irish influences in Australia and New Zealand. In S. Africa, on the other hand, the impetus came from the Dutch, and the British section is smaller. When isolated missions and sections, *e.g.* in the West Indies and in Asia, are included, the numerical strength of Presbyterianism after the Second Great War was estimated at 7,000,000.

Education and Discipline

The efficiency of the polity is shown by its development of education and of discipline. The Presbyterian churches have invariably set a high standard of education for their ministers, and this has been accompanied by a corresponding conscience for instructing the people in the faith, and also for education in schools. A presbyter must "be apt to teach" according to the New Testament, and Presbyterianism has never forgotten this duty; the administration of the sacraments, for example, is steadily viewed as one aspect of preaching the Word. As for discipline, each congregation is ruled by its own session, presided over by the minister, and consisting of elders (presbyters) elected by the people, who share the spiritual supervision of the congregation with him, aid him in administering the

Lord's Supper, and generally further the interests of the church.

Each minister, with one or more elders from his congregation, is a member of the local presbytery, the main difference being that the minister is a permanent member, whereas the elder is elected for a definite period. In some larger churches presbyteries are grouped in synods, which can act as units of review. The synod is provincial, but the assembly, which meets once a year, is national. Each presbytery sends up a fixed number of delegates, ministers, and elders. A moderator is chosen, who holds office for one year. This is the final court of appeal, and any business may come up before it from any session or presbytery by regular forms of petition. The general assembly thus represents the entire Church, and its decisions cannot be reversed, except by a subsequent assembly.

A large part of the success of Presbyterianism lies in this carefully organized recognition of popular government, which on the one hand leaves the individual congregation free to manage its own affairs and yet prevents any selfish or eccentric action, which puts the minister in a position of independence instead of leaving him at the mercy of a local few, and at the same time gives to the congregation a reasonable control over him. Thus no congregation can interfere with its minister except through the presbytery, and no one kirk-session can review or object to the proceedings of another. On the other hand, a presbytery has certain powers over all church work done by the congregations belonging to it. In mission extension this polity is found effective. Weaker causes can be helped by stronger ones, and advances can be made in the way of church extension by means of concerted effort. Presbyterian principles have been fully recognized in united churches in the mission field and elsewhere.

The World Presbyterian Alliance, founded in 1877, includes well over a hundred churches. Its council, which meets every four years, is consultant, not jurisdictional.

Bibliography. History of the Presbyterians in England, A. H. Drysdale, 1889; The Presbyterian Church, W. M. Macphail, 1908; Presbyterian Churches of Christendom, J. N. Ogilvie, 1925; The Presbyterian Churches, J. Moffatt, 1928; The Presbyterian Tradition, C. L. Warr, 1933.

PRESBYTERIANISM IN THE U.S.A. There was a considerable presbyterian element among the Puritans

of early New England, and many Presbyterians emigrated from Scotland to the American colonies in the 17th century. The first presbytery, Philadelphia, was constituted in 1706. A large accession resulted from the arrival of Scotch-Irish from N. Ireland from 1710 until past the middle of the 18th century. The Congregational and Presbyterian churches of the Eastern states tacitly agreed at the beginning of the 19th century that the Congregationalists should care mainly for New England and the Presbyterians for New York, Pennsylvania, and the South.

The slavery issue served to bring about a schism in the main body of American Presbyterians. In 1861 the Southern churches withdrew from "The Presbyterian Church in the U.S.A." and formed "The Presbyterian Church in the U.S."—a distinction in name that had nothing to do with theology or ecclesiastical polity. This separation between Presbyterians of the North and the South still persists. The Presbyterian Church of the U.S.A. now claims some 2,000,000 members, the Presbyterian Church of the U.S. 500,000, and minor bodies a total of 250,000.

Presbytery (Gr. *presbyteros*, elder). Word originally applied to that part of a church which was occupied by the clergy. First of all situated behind the altar, with the seat for the bishop in the middle, it was divided from the rest of the building by a rail or screen. In later times it meant the space immediately before the altar, as distinguished from the choir.

The term was also used to signify the body of the clergy taken together. In this sense it occurs in the Greek N.T. (1 Tim. 4, v. 14), and is thus used in the Presbyterian denominations, more especially for the official assemblies of ministers for the transaction of business.

Prescot. Urban district and former market town of Lancashire, England. It is 7 m. E. by N. of Liverpool, with a rly. station on the Liverpool-Wigan line. The principal buildings are S. Mary's church and an ancient town hall where the court leet was once held. Formerly famous for watches, the town now makes electric cables and fittings, sheet metal plating, and plastics, and has bookbinding and printing industries, and coal mines are near. Pop. 12,300.

Prescott. Town in Grenville co. Ontario, Canada. It is on the St. Lawrence and at the end of lake

navigation, 12 m. N.E. of Brockville, and is served by C.N.R. and C.P.R. There are marine works, and abrasives, tools, and brassware are turned out. Pop. 3,223.

Prescott, WILLIAM HICKLING (1796-1859). American historian. Born at Salem, Mass., May 4, 1796,



W. H. Prescott,
American historian

the son of a distinguished judge, and grandson of Colonel Prescott, who commanded the American forces at the battle of Bunker Hill, he was educated at Harvard, where he graduated with distinction in 1814. While at college he lost the sight of one eye, and the other eye became so badly affected that for long spells he was virtually blind. He entered his father's legal office, but had to abandon the law, and devoted himself to historical study. With the aid of readers and secretaries, by patient memorizing and the use of a writing frame made for the blind, working in a dark room, Prescott wrote works which are classics of history: *Reign of Ferdinand and Isabella*, 1838; *Conquest of Mexico*, 1843; *Conquest of Peru*, 1847; and the unfinished *Reign of Philip II*, 1855-58. He died in Boston, Jan. 23, 1859, and was buried in S. Paul's church there. His collected works were published in 20 vols., 1906. *American Lives* may be cited that by G. Ticknor, rev. ed. 1875.

Prescription (Lat. *praescribere*, to write beforehand). In law, title by long use and enjoyment. Such title is founded on two conceptions: (1) that when anyone has enjoyed a right for a considerable length of time it is probable that the right has a legal origin; (2) that even if the original possession was not founded on strict legal right, at any rate all rival claimants have acquiesced in it; and in all systems of law it has been found necessary, and to the public advantage, to discountenance stale claims.

In English law, uninterrupted possession for 12 years gives a good prescriptive title to land. A right of light enjoyed for 20 years is indefeasible, unless it can be shown that it was enjoyed not as of right, but under a written agreement or permission. A right of common is *prima facie* established by 30 years' enjoyment; and absolutely by 60 years; again, in the absence of a written agreement. An easement

(e.g. a right of way, or of water, or of support) is *prima facie* conferred by 20, and absolutely by 40, years' uninterrupted use, and in the absence of a written agreement.

Corporations by prescription also exist. A corporation could be created at common law only by royal charter; but when a body is found which has from time immemorial acted as a corporation, though its charter cannot be found, it is presumed to have been created a corporation lawfully. The City of London is an instance of such a corporation by prescription. See Borough; Right of Way.

Prescription. Physician's order to a dispenser for the supply of medicine. The ingredients are usually written in abbreviated Latin, prefaced by the sign *R* which may originally have implied a prayer to Jupiter, but is now regarded as a contraction of *recipe* or "take thou." Quantities are usually given in apothecaries' weights, and old signs are used. Prescriptions are copied by the dispenser in a prescription book.

Present. In grammar, one of the tenses, or times, of the verb. Strictly, it denotes an action or event taking place at the time when it is referred to: e.g. I write, or I am writing. The present is also used of habitual actions, e.g. he goes to school every day; of past events (historic or graphic present), e.g. Nelson draws his sword; of future events, e.g. I start tomorrow.

Presentation. Eccles. term for the offering to a bishop, by the patron or owner of a benefice or living, of a clerk in holy orders as a suitable incumbent of that living. The English law governing presentation is set out in the Benefices Act, 1898. See Advowson; Benefice; Ecclesiastical Law.

Presentment. In English law, bringing before the court facts which a jury of inquiry and presentment has investigated. Grand juries until practically abolished in 1933 were usually called to do this, their duty being to inquire into the facts alleged against an accused and find a true bill or no bill according to whether or not they considered a case was made out on which the accused should be tried. Coroners' juries are also juries of inquiry and presentment.

Presidency. Former administrative division of British India. The name was originally given to those units of the East India Company's territory administered by the presidents of the company's factories. The original three were

Bengal, Madras, and Bombay; Penang was chosen as a fourth, but the scheme was dropped on the acquisition of Singapore. The term Presidency was abolished by the constitutional changes of 1935.

President (Lat. *praesidere*, to sit in front of). Word which denotes headship, with many applications. It is the recognized title of the head of a republic. The head of a college in a university is sometimes called the president; in some colleges at Cambridge the title is applied to the second official. The term is also used of the head of a society, and in the U.S.A. of the chairman of a company. The word occurs in the title of many British ministerial and legal offices, e.g. lord president of the council, president of the board of trade, president of the probate, divorce, and admiralty division, and lord president of the court of session. Tables are given of the presidents of the U.S.A. and of the French republic since 1870. The first two presidents of Eire were Douglas Hyde, 1938; Sean O'Kelly, 1945.

PRESIDENTS OF THE FRENCH REPUBLIC

	<i>Elected</i>
Louis Thiers	1871
M. E. P. M. MacMahon	1873
Jules Grévy	1879
†Sadi Carnot	1887
Jean Casimir-Périer	1894
Félix Faure	1895
Emile Loubet	1899
Armand Fallières	1906
Raymond Poincaré	1913
†Paul Deschanel	1920
Alexandre Millerand	1920
Gaston Doumergue	1924
†Paul Doumer	1931
Albert Lebrun	1932
(Office lapsed in 1940)	
Vincent Auriol	1947
† Died in office. ‡ Assassinated.	

President, H.M.S. Vessel of the British navy. The first President was a vessel of 42 guns built under the Commonwealth, and renamed Bonaventure at the Restoration in 1660. In 1887 a sloop of 1,140 tons was launched at Sheerness and named President. With her engines removed, she was stationed between Blackfriars Bridge and the Temple Stairs, and served as a stationary drillship for the London division of the R.N.V.R. until 1922. In that year a larger training ship, the Saxifrage, a sloop built during the First Great War, and renamed the President, took its place. In the Second Great War she was a merchant navy gunnery training school, and in 1947 was refitted at

PRESIDENTS OF THE U.S.A.

	<i>Inaugurated</i>
George Washington	1789
John Adams	1797
Thomas Jefferson	1801
James Madison	1809
James Monroe	1817
John Quincy Adams	1825
Andrew Jackson	1829
Martin van Buren	1837
†William Henry Harrison	1841
John Tyler	1841
James Knox Polk	1845
†Zachary Taylor	1849
Millard Fillmore	1850
Franklin Pierce	1853
James Buchanan	1857
†Abraham Lincoln	1861
Andrew Johnson	1865
Ulysses Simpson Grant	1869
Rutherford Birchard Hayes	1877
†James Abram Garfield	1881
Chester Alan Arthur	1881
Stephen Grover Cleveland	1885
Benjamin Harrison	1889
Stephen Grover Cleveland	1893
†William McKinley	1897
Theodore Roosevelt	1901
William Howard Taft	1909
Thomas Woodrow Wilson	1913
†Warren Gamaliel Harding	1921
John Calvin Coolidge	1923
Herbert Clark Hoover	1929
†Franklin Delano Roosevelt	1933
Harry Shippe Truman	1945
† Died in office. ‡ Assassinated.	

Chatham. The great majority of naval officers serving at the Admiralty, or under the direct orders of Admiralty departments, are borne on the books of the President for purposes of pay and records.

Press. Comprehensive term for the output of the printing press. It is especially applied to newspapers and periodicals. See Journalism; Newspaper; Periodical. See also Censorship.

Press. For this apparatus in metallurgy see Forging Press.

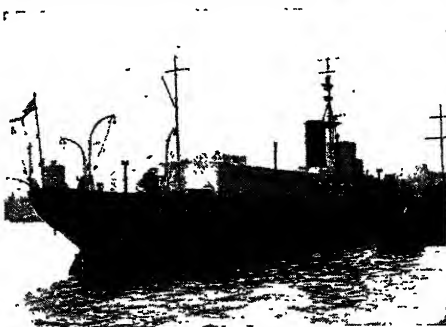
Press Association, LIMITED. British news agency. It was founded in 1868, cooperatively by provincial newspaper proprietors,

to collect and distribute news. Its first news message, Feb. 5, 1870, was also the earliest press message sent over the state-owned telegraph system. The P.A. now operates its private wires (over leased post office wires) to supply home news to London and the provinces, the B.B.C., and to Reuter for overseas distribution. It is the sole distributor in the British Isles outside London of Reuter's world news. The managers have been John Lovell, 1868-80; Edmund Robbins, knighted on retirement in 1917; then H. C. Robbins; and from 1938 Edward Davies. The chief office is 85, Fleet Street, London, E.C.4.

Press Club. London club founded in 1882 by parliamentary and Fleet Street journalists, including G. A. Sala, first of a line of famous presidents. Membership, of which there are several classes, is limited to 1,500. Noted as the social centre of Fleet Street, and host to many distinguished guests, it has for its outstanding annual function the Derby lunch, started by Edgar Wallace. The club is noted for its reference library and newspaper collections. Col. J. J. Astor, proprietor of The Times, became president in 1935. The address is St. Bride's House, Salisbury Square, E.C.4.

Press-Gang. Name given to the bodies of men who formerly carried out the impressment of those liable to forced service in the army or navy. Although impressment (*g.v.*) could be for either land or sea service, it came to be used almost entirely to secure recruits for the navy. Edward III set up a commission of impressment, 1355, and the methods of carrying out the press were regulated by statute in 1378, and on other occasions. In 1641 parliament declared the system illegal, but it was used later for land service by Cromwell, and throughout the 18th century and until 1815 the press-gang operated in seaports.

Seafaring men between 18 and 55 years of age were liable, with certain excepted classes. The press-gang used to land from a warship, seizes likely men, and convey them to the ship as prisoners. Brutality was rife, as the novels of Smollett and Marryat bear



H.M.S. President. The converted sloop used as headquarters of the London division R.N.V.R., lying off the Victoria embankment, London

witness. Even sailors actually serving on board a merchantman could be seized, and vessels were thus sometimes left almost helpless. In 1798 the exemption of certain classes of seamen was suspended for five months. The press-gang method was efficient neither in the quality nor always in the number of the recruits secured by it.

The system disappeared after the Napoleonic wars. An Act of 1835 limited the service of men so taken to five years, but the right of impression was never disowned.

Press Officer. Person appointed by any corporate body, from a govt. department down to any small society or club, to maintain relations with newspapers and other journals so that the work and aims of the body shall be accurately presented therein. His function is twofold: to obtain the desired kind and amount of press publicity by a voluntary supply of information, also to supply additional information at the request of the press. The duties call for considerable exercise of discretion, as well as practical knowledge of the press point of view. Newspapers do not invariably look upon press officers with favour, being suspicious that official "hand-outs" of information may be coloured to suit the purposes of those who issue them whether the information has been asked for or not, or that other items of information they seek may be withheld. On the other hand, the press officer is admittedly useful to the newspapers in saving much time, trouble, and expense. Most govt. departments and large business enterprises now employ regular press officers, their work being often combined with, or subordinate to, the wider range of Public Relations Officer (*q.v.*).

Pressure. Concept in physics. The pressure at a point is measured by the force exerted on unit area around that point. In the C.G.S. system pressure is given in dynes per sq. cm.; but engineers use lb. per sq. in. The centre of pressure of a body is that point at which the resultant of all the pressures may be assumed to act. *See Gas.*

Pressure Cooker. This apparatus is in principle an autoclave and is so described in this work.

Pressure Gauge. Instrument for measuring the pressure of fluids. For ordinary purposes pressures are expressed in lb. per sq. in. or kg. per sq. cm. The form of gauge most widely used by engineers is the Bourdon, which takes advantage of the fact that an

elastic tube of flat section, bent to a curve and closed at one end, will endeavour to straighten itself out, if a gas or liquid be forced into it.

Another form of gauge, the Schäffer-Budenberg, depends for its action on the elasticity of a thin corrugated metal plate, exposed to pressure on one side. As the plate bulges outwards, it pushes up a rod which actuates a quadrant and rack like that of the Bourdon gauge. Vacuum gauges for condensers, brake apparatus, etc., are similar to those described above, but their motions range in the inward direction from the normal position of the spring or disk, and the index hand is set accordingly. Spring-controlled pressure gauges should be tested periodically for accuracy, as a spring is likely to lose some of its elasticity. Tests are made by either a miniature hydraulic accumulator with a sensitive ram weighted to give any desired pressure, or a gas manometer. In this instrument a body of gas, usually air, is imprisoned in a glass tube and compressed by a column of mercury. Readings are taken in accordance with Boyle's law that the pressure of the gas varies inversely as the space it occupies.

The hydrostatic manometer is useful for measuring small pressures, such as those in stokeholds under forced draught, gasometers, etc. It consists of a glass U-tube containing mercury or water. One leg is open to the air, the other to the chamber the pressure in which is being tested. Pressure is estimated from the difference in level of the surfaces in the legs, and expressed in inches of mercury or water.

In ballistics, a pressure gauge is an instrument for measuring the pressure developed by the gases when an explosive is fired in a closed space. It consists of a stout steel body having at one end a piston, provided with a gas check consisting of a copper cup. The inner end of the piston bears against a copper cylinder, and the extent to which the latter is crushed is equivalent to the pressure developed. *See Manometer.*

Pressurisation. Aeronautical term. It is applied to apparatus to maintain the interior atmosphere of a cabin at ground pressure while the machine is flying in a rarified atmosphere that makes normal breathing impossible. In most military aircraft the crew are provided with oxygen masks; but in passenger-carrying machines the cabins are pressurised. Air is drawn into the aircraft through a

combined scoop and inertia filter fitted to the leading edge of the wing outboard of the airscrew flow, away from air contaminated by exhausts. From the filter scoop the air passes through ducts to two blowers, mounted one on each outboard engine gearbox; those raise the air to a normal pressure. The filtered air then enters the fuselage through a spill valve and is distributed through floor ducts to mushroom-headed outlets in the roof and sides of the fuselage. To prevent any air other than that received through the blower entering the cabin, windows, doors, and joints are securely sealed. As the pressure of air inside is greater than that outside, pressurised cabins have to be very strongly constructed.

Prestatyn. Urban district of Flintshire, Wales. It stands on the coast 4 m. E. of Rhyl, with a rly. station. There are remains of a Roman camp, and ruins of a castle. Here also is a large holiday camp. In the neighbourhood are lead mines. Pop. 8,250.

Presteigne. Urban district and market town of Radnorshire, Wales, also the county town. It stands on the Lugg, 33 m. W. by N. of Worcester, and has a rly. station. The chief buildings are the parish church of S. Andrew, of many periods but dating mainly from the 15th century, the guild hall, and the market hall. The Warden is a hill converted into a public recreation ground; the castle formerly stood here. Lugg Bridge marks the boundary with England. Excellent angling is available. John Bradshaw, the regicide, was born in Presteigne. Owen Glendower burned the town in 1401. Market day, Wed. Pop. 1,100.

Prester John. Priest-king in the 12th century. The centre of many legends and theories, by name Jorkhan or Coirkhan, and a native of Asiatic Tartary, he is said to have been converted by Nestorians from Buddhism to Christianity. When he became king he assumed the title of Prester, i.e. presbyter or elder, vanquished the rulers of Media and Persia, and attempted to march to the aid of the Church at Jerusalem, but got no farther than the Tigris. He was succeeded by his son or brother, who also called himself Prester John, and who was killed by Jenghiz Khan.

He was reputed to have been a descendant of the ancient Magi. Pope Alexander III is reported to have addressed him as king of the Indies and most holy of priests.



1. Diamond, Kimberley, S. Africa 2. Opal, Queensland, Australia 3. Ruby (Corundum), Upper Burma 4. Chrysoberyl (Cat's Eye), Russia 5. Turquoise, Khorassan, Persia 6. Chrysoberyl (Alexandrite), Ceylon

7. Topaz, Brazil 8. Emerald (Beryl), Colombia, S. America 9. Tourmaline, California 10. Sapphire (Corundum), Upper Burma 11. Garnet (Almandine), Russia 12. Amethyst, Brazil

PRECIOUS STONES: GEMS IN THEIR NATURAL AND FINISHED STATES See text p. 6677

Marco Polo's report of a Christian kingdom in India named Abascia or a conjecture of a Portuguese traveller, Peter Covillanus, in the 15th century, appears to be responsible for the theory that the land ruled by Prester John was Abyssinia. J. E. Fischer, in his *History of Siberia*, attempted to identify him with the first Grand Lama of Tibet.

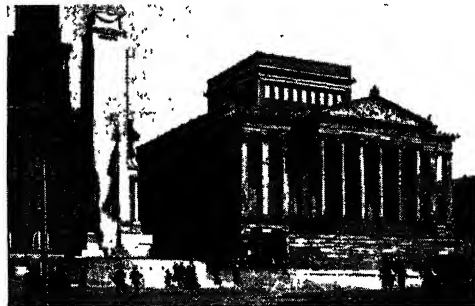
Described in the *Travels of Sir John Mandeville* as a descendant of Ogier the Dane, one of the paladins of Charlemagne, Prester John is referred to in Shakespeare's *Much Ado About Nothing*, figures in Ariosto's *Orlando Furioso* as a blind king of Ethiopia, and gives his name to an African romance for boys by John Buchan, 1910.

Preston. County and mun. borough and seaport of Lancashire, England. It stands near the head



Preston arms

of the Ribble estuary, 209 m. N.W. of London and 31 m. of Manchester. There are rly. stations, and a canal connects it with Lancaster. The edifices include the modern municipal building, town hall (another modern building, and seriously damaged by fire in 1947), post office, sessions house, Harris institute, Harris free library



and museum, technical school, and public hall. There is a grammar school, founded in 1550, and the town has several parks, especially Avenham, Moor, Ashton, and Ribbleton Parks. The churches, which include several belonging to the Roman Catholics, are all modern; the chief are S. John's and S. Walpurgis (R.C.). Preston is one of the chief centres of the cotton industry; it has also engineering and machinery works, iron and brass foundries, and shipbuilding yards. There is a harbour with docks covering 40 acres, and owing to the deepening of the channel

after 1884, vessels of 5,000 tons can reach the port. Horse and cattle fairs are held besides an annual pot fair.

The name Preston is a corruption of priests' town, originally given because of the number of religious houses. The first charter was granted in 1179, and others followed, allowing the citizens fairs, markets, and other privileges. Preston became prosperous, with the decline of Ribchester. A Roman Catholic stronghold since the Reformation, in 1715 it was taken by the Jacobites and thereupon attacked by the king's troops, the result being that Forster and 1,400 men surrendered. Preston was the birthplace of Arkwright, who in 1769 erected his spinning jenny here. An ancient festival known as the Preston guild is held every 20 years, the first on record having taken place in 1328. The town is governed by a mayor and corporation. It owns the docks and harbour. Two members are returned to parliament. Market days, Wed. and Sat. Pop. est. 116,440. See Preston North End.

Preston, BATTLE OF. Fought between the Scots in the interests of Charles I and the parliamentarians under Cromwell, Aug. 17, 1648. Cromwell's army numbered about 9,000; the royalists had 24,000, but these were not all engaged at once. Some 4,000 royalists surrendered at Preston, and at least an equal number afterwards. Those who had not been brought to action were pursued by Cromwell, and at Winwick another 2,000 were taken prisoners. Many others of the royalists surrendered at Warring-

ton, while their leader, the duke of Hamilton, and the cavalry gave themselves up to the parliamentarians at Uttoxeter.

There was some fighting at Preston during the Jacobite invasion of England in 1715, and some 1,500 Jacobite prisoners were taken, including their leaders, Thomas Forster and the earl of Derwentwater. See Civil War; Jacobites.

Preston, SIR HARRY JOHN (1860-1936). British sportsman and philanthropist. Son of a soli-



Sir Harry Preston, British sportsman

citor, he was born Feb. 19, 1860. A boxing enthusiast, he was described as "the companion of princes, the counsellor of prize-fighters, and the bosom friend of bishops." For many years he was manager and part owner of the Royal Albion Hotel, Brighton. He raised £100,000 for hospitals, and was knighted in 1933. Preston, who published his memoirs in 1928, died Aug. 13, 1936.

Preston North End. English Association football club. One of the first clubs to adopt professionalism, Preston North End helped to form in 1888 the Football League, the championship of which they won in the first two seasons. Preston won the F.A. cup in 1889, and in that season they set up the record performance of winning the league without losing a match, and the cup without conceding a goal. They were cup finalists again in 1922 and 1937 and winners in 1938. Their ground is at Deepdale Road, Preston, and their colours are white shirts and dark blue knickers.

Prestonpans. Police burgh of East Lothian, Scotland. It stands on the Firth of

Forth, 9 m. E. of Edinburgh. The main industry is mining, but there are also brick and tile works and a brewery. The salt industry, whence the word pans in the name of the town, is still in existence. It was begun about 1200 by the monks of Newbattle, and was flourishing in the Middle Ages



Preston, Lancashire. Fishergate, the city's administration centre. Top, the Harris Museum in Market Square, with left, the memorial to the dead of the First Great War

Prestonpans was made a police burgh in 1892, but was a burgh of barony for a long period before that date. Pop. 2,819.

The battle of Prestonpans was fought between the royal troops and the Jacobites in 1745. The former under Sir John Cope, about 2,300 strong, landed at Dunbar, and marched towards Edinburgh. Prince Charles Edward with an equal force set out from that city to meet them, and the armies came face to face at Prestonpans on Sept. 21. The Highlanders dashed upon the waiting royalists under cover of the morning mist, and in a few minutes the guns were captured and the infantry put to flight, being cut down as they ran. Cope's army was destroyed, and he, with a few horsemen, fled to Berwick. The Jacobites called the engagement Gladsmuir.

Prestwich. Municipal bor. of Lancashire, England. It is 4 m. from Manchester, with three rly. stations. The town's principal building is the 13th century Gothic church of S. Mary, and the chief industry the manufacture of cotton. Here are two Manchester water reservoirs. Prestwich shares an M.P. with Middleton. Near is Heaton Park, once a seat of the earl of Wilton; it was transferred to the city of Manchester in 1903. Pop. 34,130.

Prestwich, Sir Joseph (1812-96). British scientist. Born at Clapham, March 12, 1812, he was educated at private schools and at University College, London. He entered business life in London, but spent his leisure in the study of geology, making himself one of the foremost geologists of the day. His work brought him a number of honours, including that of F.R.S. He was an authority on coal, was a member of the royal commission on the water supply, and contributed to our knowledge of primitive man. During 1874-87 he was professor of geology at Oxford. Knighted in 1896, he died at Shoreham, Kent, June 23, 1896. His chief work was *Geology: Chemical, Physical, and Stratigraphical*, 1886-88.

Prestwick. Police burgh of Ayrshire, Scotland. It stands on the Firth of Clyde, 2 m. N. of Ayr, with a rly. station. An ancient place, it was made a burgh in 1600. A great golfing centre, it has an international airport, the chief Scottish airport, and in Great Britain second only in importance to London airport. During the Second Great War this was the

British terminus of the Atlantic air ferry. Pop. 12,000.

Presumption. Legal term for an inference of fact drawn from established facts. Presumptions are a branch of the law of evidence, and are of two kinds: (1) *Juris*, or rebuttable, where, a fact or set of facts being proved, the court is bound to draw a particular inference; but that inference may be disproved by evidence. (2) *Juris et de jure*, or irrebuttable, where, a fact or facts being proved, the court is bound in law to draw a particular inference; and no proof can be received that such inference is false. An accused person is presumed innocent until his guilt is proved.

PRESUMPTION OF DEATH. In English law if no news of a person has been received for 7 years in spite of inquiries by those who would naturally hear if he were alive, the person is presumed to be dead and the court may make a declaration to that effect. Under the Matrimonial Causes Act, 1937, a presumption that a spouse is dead arises when he or she has been absent from the other party to the marriage for 7 years and that party has no reason to believe he or she has been alive within that time. In the absence of contrary evidence the court may presume the death and dissolve the marriage. Where two or more persons have died at a date later than Dec. 31, 1925, in circumstances rendering it uncertain which survived the other, e.g. in an air raid, then the deaths are presumed to have occurred in order of seniority.

Pretender (Lat. *praetendere*, to hold forward). One who makes a claim which is either false or not admitted. The term is most frequently used for those who claim crowns to which they are not lawfully entitled, e.g. Lambert Simnel. In a special sense the word is applied to the son and grandson of James II., referring to their claim to the throne of Great Britain. James Edward is known as the Old Pretender, and his son Charles Edward as the Young Pretender. See Charles Edward; Jacobites; James Edward.

Preterite (Lat. *praeter*, before). Grammatical term signifying the



Prestwick, Scotland. The airport, the site of which was chosen for its remarkable freedom from fog

tense of a verb which expresses absolute past time. "I was singing" is imperfect; "I have sung" is perfect; "I sang" is preterite.

Pretoria. City of the Transvaal, capital of the province, and administrative capital of the Union of South Africa.



Pretoria arms

It is 1,000 m. by rly. N.E. of Cape Town and lies 35 m. N. of Johannesburg. It is also on the direct line from Durban and thus an important rly. junction. It stands on both sides of the Aapjes river, alt. 4,471 ft., at the foot of the Magaliesberg Mts.

The centre of the town is Church Square, from which the main streets radiate. The chief buildings are the block erected by Sir Herbert Baker for the union government and opened in 1912, in which is accommodation for public officials. Another fine pile in Church Square, the Raadzaal, is occupied by the government of the Transvaal. Government House, the residence of the governor-general, overlooks the town, and in Pretorius Street are other public offices. There are a fine railway station, law courts, and a large post office. Other erections are the city hall and the market buildings. There are a state library and several museums. The Anglican cathedral of S. Alban is the chief of many churches.

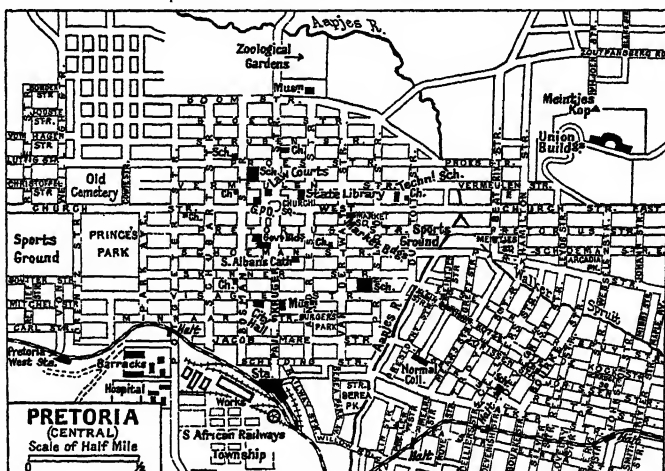
The federal university of S. Africa has its seat here, and Pretoria university was founded in 1930. A monument and amphitheatre commemorating the Voortrekkers (*q.v.*) were dedicated in 1949. The city has several parks, among them being Burger's and Prince's Parks, the latter named in memory of Prince Christian Victor, and zoological and botanic gardens; the jacaranda trees, blooming in Oct.-Nov., are a celebrated feature. The city has a good water

supply and a service of electric tramways. Manufactures include bricks, cement, furniture, leather goods, paints, pottery, insecticides, and metal products. Here also is the Radcliffe Observatory (*q.v.*) transferred from Oxford.

Paul Kruger is buried here; Winston Churchill was a prisoner of war at a school in 1899. Pretoria was founded in 1855 by M. Pretorius, first president of the Transvaal. In 1860 it became the seat of government of the Transvaal. Pop. 236,367 (124,542 white).

Pretorius, ANDRIES WILHELMUS JACOBUS (1799–1853). Boer soldier. One of the leaders of the Great Trek, he reached Natal in 1838 and there was elected commandant-general, leading his troops to defeat the Zulu king Dingaan on Dec. 16. He unsuccessfully attacked the British, 1842. In 1852 he concluded the convention with Great Britain whereby the latter recognized the independence of the Transvaal. He died July 23, 1853.

Pretorius, MARTINIUS (1819–1901). Boer leader. Son of Andries



Pretoria, Transvaal Plan of the central districts of the city

liable to suffer from outbreaks of, *e.g.*, cholera, deriving from defective conditions in the towns. The Public Health Act, 1875, brought the provision of isolation hospitals, compulsion to

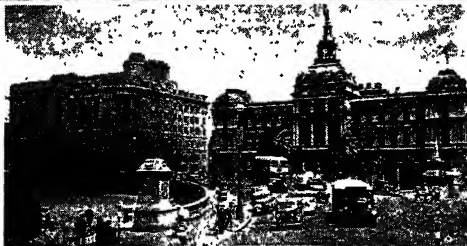
structive and positive in its aim. The introduction of school medical inspection in 1907 was an important step forward for the welfare of the rising generation. The National Insurance Act of 1911

had less preventive value than had been anticipated, and the loss of manpower through minor sickness, *e.g.* even the common cold, continued to be a serious obstacle to the economic prosperity of the nation.

The Pioneer Health Centre (*q.v.*) led the way in presenting a conception of health as something other than the mere absence of disease.

Pretorius, he succeeded to the general command on his father's death, and prosecuted several vigorous campaigns against the natives. In 1856 he was elected president of the newly founded South African republic, which remained little more than a name for eight years. His policy of conciliation with the British diggers created such unpopularity with the Boers that he resigned in 1871. In 1880 he was associated with Kruger and Joubert in the Boer revolt against British annexation of the country. Pretorius died May 19, 1901.

Preventive Medicine. Term for that branch of medical science which specialises in the prevention, rather than the cure, of disease. The first Public Health Act in the U.K., 1848, was a measure which dealt with the environmental conditions of life. Experience had shown that the people could not be healthy without satisfactory sewer arrangements, adequate supplies of pure water, and decent housing. Without these the whole community was



notify infectious diseases, vaccination, supervision of common lodging-houses, etc., under the direction of the medical officer of health. Before the passing of that Act emphasis was upon the removal of nuisances. After it, preventive medicine became con-



Pretoria, Transvaal. Top, Union buildings overlooking the city. Centre, Church Square, where the Law Courts (bottom) are situated

During the Second Great War, everything possible was done to keep the men and women in the forces healthy. Health education through the radio was aimed at civilians. Rationing by its even distribution of available food throughout the whole population, the provision of canteens, and the supply of milk for mothers and young babies helped to maintain the health of the people, in spite of the strain of the war years, at an exceedingly high level.

Although the National Health Service Act, 1946, laid stress upon the hospital service, it contained the possibility of a real health service through the health centres which the local authorities are required by the Act to provide (see Health Centre). One of the difficulties of enlarging the scope of preventive medicine is that the education of doctors has always been directed too much towards specialisation in disease, and little study has been devoted to an analysis of what constitutes health. *Consult Report on the British Health Services*, P. E. P., 1937; *An Approach to Social Medicine*, J. D. Kershaw, M.D., 1946; *Local Government*, Sir A. MacNalty, 1948.

Preventive Service. Former branch of the coast defence service of the U.K. The preventive service came into existence after the end of the Napoleonic wars, to suppress smuggling on the S. coast of Sussex. Two naval vessels, *Ramillies* and *Hyperion*, were commissioned, chiefly with half-pay naval lieutenants, but the officers were actually stationed at various points along the coast with the necessary men and boats. By 1830 the service had expanded to include many vessels up to 200 tons, revenue cutters, etc., and in 1845 men who joined the preventive service were required to sign on to serve in the navy in case of emergency. After 1857 the service became the Coast Guard (*q.v.*) service.

Prevesa or PREVEZA. Town of Greece. Situated on the W. coast at the entrance of the gulf of Arta, it has a considerable shipping trade, and exports olives and olive oil. Pop. 8,659. The ruins of Nikopolis, founded by Augustus to commemorate the battle of Actium, lie 4 m. N. Prevesa gives its name to a dept. of Epirus; pop. 77,368.

Prévost, EUGÈNE MARCEL (1862-1941). French novelist. He was born in Paris, May 1, 1862, and worked as engineer in a Lille factory until 1891, by which time he had attained popularity with his stories. His novels, which

followed one another in rapid succession, include *Le Scorpion*, 1887; *La Cousine Laura*, 1890;



Eugène Prévost,
French novelist

Lettres de Femmes, 1892, followed by *Nouvelles Lettres*, 1894, and *Dernières Lettres*, 1897; *Les Demi-Vierges*, 1894; *L'Heureux Ménage*, 1901; *Lettres à Françoise Mariée*, 1908; *La Retraite Ardente*, 1927. A play, *La Plus Faible*, produced at the Comédie Française in 1904, enjoyed great success. In 1919 Prévost was elected to the Academy, and he lived until April 8, 1941. *Prom. Pray-vo.*

Prévost d'Exiles, ANTOINE FRANÇOIS (1697-1763). French abbé and author. He was born at Hesdin, Artois, April 1, 1697, and educated by the Jesuits, and saw some military service before joining the Benedictine order in 1721. In 1728, following a period of exile in Holland and England, he published his first novel, *Mémoires d'un Homme de Qualité*, of which the enchanting *Manon Lescaut*, 1733, was a sequel. He spent most of the rest of his life near Chantilly, writing industriously, but none of his other works is remembered. He died Nov. 23, 1763. His works were published in 39 vols. in 1806, and an Eng. trans. of *Manon Lescaut*, with Life of Prévost, in 1841. *Prom. Pray-vo deg-zeel.*

Preysing, KONRAD, COUNT (b. 1880). German ecclesiastic. He was born Aug. 30, 1880, near Landshtut, of the Bavarian aristocracy. Destined for diplomacy, he studied law, and worked in the foreign office at Munich and at the Italian court before going to study theology at Innsbruck. Writing on history and canonical law, he came into contact with the nuncio who was later Pope Pius XII. In 1928 Preysing took pastoral office at the chapter of Munich cathedral; in 1932 was appointed R.C. bishop of Eichstätt; in 1935, of Berlin, where he valiantly resisted Nazi suppression of thought and encroachment upon the Church. In 1946 he was created cardinal.



A.F. Prévost d'Exiles,
French author

Priam. In Greek mythology, king of Troy, son of Laomedon and father of Hector, Paris, Troilus, Deiphobus, Polyxena, Cassandra, and other children. He was popularly credited with fifty sons and daughters. He was the only one of the sons of Laomedon that was spared when Hercules came to take vengeance for being cheated out of his reward for saving Hesione (*q.v.*) from the sea-monster. When Hector had been killed by Achilles, Priam, in a pathetic and powerful scene in the *Iliad*, visits the conqueror in the night-time to beg for the body of his son. At the taking of Troy, Priam was killed by Neoptolemus, or Pyrrhus, the son of Achilles. See Homer; Troy.

Priapus. In Greek mythology, god of the reproductive powers of nature, and patron of gardens. He was the son of Dionysus and Aphrodite, and was especially worshipped at Lampsacus on the Hellespont. His worship often degenerated into licentiousness. Statues of Priapus were to be found in gardens.

Pribalkhash. District of Kazakh S.S.R. It has large refineries for smelting copper from the mines N. of lake Balkhash, and is traversed by a line linking the Transkazakh rly. with the Turkestan-Siberian rly.

Pribilof Islands. Group of small islands in Bering Sea. Situated about 200 m. S.W. of the Alaskan mainland, they are an important centre of the fur-seal fisheries, and were constituted a reservation in 1868. The islands, of volcanic formation, were first visited in 1786 by Gerasim Pribilof, after whom they were named. They were acquired by the U.S.A. from Russia in 1867. See Bering Sea Question.

Pribram. Town of Czechoslovakia, in Bohemia. It is 18 m. S. of Beraun, and is famous for its silver-lead mines. On the Sacred Mount (1,903 ft.) are the Redemptorist convent and a church, much visited by pilgrims. Pop. 10,468.

Price. Value expressed in money. The term is, however, not confined to the time of actual selling; a trader's price often states a willingness to sell for that sum; a list price or catalogue price may be merely a basis from which the true price will be calculated by the deduction of trade discount; the cost price may be the total expended to make an article; the sale price, the sum of money a manufacturer is willing to accept in exchange for the article. A market price is a price determined at any time

through the competition of buyers and sellers. It tends to be the amount that will make the quantity offered for sale equal to the quantity demanded. Normal price is the economist's term for the theoretical price that would tend over a long period to make the quantity offered equal to the quantity demanded. Market price tends to oscillate around normal price, which, since it will maintain supplies, must be above current cost of production.

During and after the Second Great War many prices were fixed by official price control orders, which stated the maximum prices that might be charged, by wholesalers and by retailers, or the maximum percentage that traders might add to their own cost prices when deciding the prices at which certain goods were to be sold. Other government orders issued under various statutes prescribed minimum prices, particularly for work done and for certain agricultural produce.

The price of a commodity tends to increase (a) if the quantity of money available to customary purchasers increases; (b) if the quantity of the commodity available for sale (stock) decreases; (c) if the desire to possess the commodity becomes more widespread or more intense through a change of taste, fashion, etc. (increased demand); (d) if buyers of the article have to pay an increased amount of purchase tax or other tax; (e) if substitute commodities cease to be available (this is a special case of (b) above); (f) if costs of production or costs to importers rise; (g) if competition among suppliers is eliminated. For these reasons prices are an important part of the mechanism for shaping economic activity. The price expected to be received is one of the indicators that producers follow when deciding what they will produce and how much, since most goods are produced only in the anticipation that it will be possible to sell them profitably; falling prices therefore discourage production. When prices generally rise, the value of money falls; and conversely. See Money; Index Number; Inflation.

Price, LILLIAN NANCY BACHE (b. 1880). British actress. Born at Kinver, Worcs, Feb. 3, 1880, she was educated at Malvern, and made her first stage appearance at Birmingham in 1899. The following year she joined Benson's company and appeared at the Lyceum, London, as Olivia in Twelfth Night.

She later became a well-known character actress, her most striking performances including: Mrs.



Nancy Price,
British actress

Alving in Ghosts, Mme. Raquin in Thou Shalt Not (dramatisation of Zola's Thérèse Raquin); Mrs. Borkmann in John Gabriel Borkmann; Adeline in Whiteoaks; and Mrs. Dundass in Lottie Dundass. She was also well known as a producer, and appeared in films. She published *Shadows on the Hill* (memoirs), 1935. Nancy Price was hon. director of the People's National Theatre from 1933.

Price, RICHARD (1723-91). British economist and philosopher. Born at Tynton, Glamorganshire, Feb. 23, 1723, he was educated in London. His father was a dissenting minister, as was he for a time, though he soon became known as a writer. His writings against the war with the American colonists, to which Burke replied, made him famous. As a philosopher, he dealt mainly with ethics, his chief work being a *Review of the Principal Questions in Morals*, 1757. Price died April 19, 1791.

Price Index. Device to make it possible to compare easily and frequently variations in the general level of prices relating to a selected list of commodities and/or services. It is commonly used for comparing changes in the cost of living, the cost of different classes of stocks and shares, etc. A base year is selected and the level of prices ruling for the commodities and/or services selected at that time is made to represent 100. Thereafter the average price for those items at any given date is expressed by a number which indicates the rise or fall above or below 100. In many cases the items are "weighted" according to their relative importance, to obtain a more accurate comparison for practical purposes, e.g. if bread and ice-cream prices were included in a list of items compiled for the construction of a cost of living price index, it would be wise to weight the price of bread relative to that of ice-cream.

Prichard, JAMES COWLES (1786-1848). British ethnologist. Born at Ross, Herefordshire, Feb. 11, 1786, of Quaker parentage, he studied medicine in London, became M.D. Edin., 1808, then studied at Cambridge and Oxford,

and practised medicine in Bristol. His *Physical History of Mankind*, 1813, culminating in his *Natural History of Man*, 1843—both subsequently enlarged—influenced British anthropological research. He was elected F.R.S. and president of the Ethnological Society. His *Eastern Origin of the Celtic Nations*, 1831, was a landmark in Aryan study. He died in London, Dec. 22, 1848.

Prickly Heat. Affection of the skin of Europeans occurring in tropical and sub-tropical regions, and occasionally in temperate zones during hot weather. It is due to the effect of heat on the sweat glands, which become sodden. An eruption of small papules occurs on the skin, associated with severe itching and profuse sweating. The condition generally disappears quickly under proper treatment. The patient should be kept cool, should not drink much, and should avoid hot tea. Sea bathing is undesirable. A lotion or powder containing boric acid may be applied to the skin after using a lotion containing one part in 1,000 of corrosive sublimate in eau de cologne.

Prickly Heath (*Pernettya mucronata*). Evergreen shrub of the family Ericaceae. A native of Pata-



Prickly Heath. Spray with leaves, flowers, and, right, berries. Inset: single flower

gonia, it has stiff oval leaves with toothed edges, and urn-shaped, nodding white flowers. The fruit is a globular berry, about the size of a pea.

Prickly Pear (*Opuntia vulgaris*). Succulent shrub of the family Cactaceae. It is a native of the warmer parts of America. A jointed, prostrate, or spreading plant, the light green joints are of oval shape, and the leaves reduced to minute scales. The spines are small, solitary, or absent, though there are clusters of barbed bristles. The flowers are pale yellow, opening only in sunshine, and are suc-

ceeded by smooth pulpy, edible, egg-shaped fruits. *O. tuna* is a larger species, more spiny, with larger



Prickly Pear. Cactus of tropical America, *Opuntia microdasys*

fruit (West Indies); and *O. ficus-indica* (Mexico) furnishes the so-called Indian figs. The last named species was introduced into the Mediterranean area for the sake of its fruit; but, finding the climate suitable, it spread so rapidly that it became a pest.

Prick-Song. Term formerly used for music which was written down, prick, in the sense of a mark, being an old name for a musical note. The term was also applied to divisions upon a ground, and to descant upon plainsong.

Pride, THOMAS (d. 1658). English regicide. On the outbreak of the Civil War he joined the parliamentary army and won rapid promotion. In 1645 he distinguished himself in command of a regiment at the battle of Naseby. On Dec. 6, 1648, to prevent the parliament from coming to an agreement with the king, Colonel Pride, with a body of soldiers, forcibly prevented about 140 members from taking their seats, arresting over 40 of them. This episode is known as Pride's Purge. At the beginning of the following year he was one of the commissioners at the trial of Charles I, and signed the death warrant. He died Oct. 23, 1658.

Pride and Prejudice. Novel by Jane Austen. Written during 1796-97, it was originally entitled *First Impressions*. The author's first novel, it was published anonymously in 1813, two years after the appearance of her second book, *Sense and Sensibility*. One of her most popular works, it is notable for the finely drawn portrait of the vivacious Elizabeth Bennet, whose prejudice against the proud Mr. Darcy gradually turns to understanding and love. Its subsidiary characters reveal Jane Austen as a

master of gentle satire: the brilliantly drawn portraits of Mr. and Mrs. Bennet, the sycophantic Mr. Collins, the bombastic Lady Catherine de Burgh, and the feckless Lydia Bennet. The best-known dramatisation was that by Helen Jerome, produced at St. James's Theatre, London, 1936. Another, Miss Elizabeth Bennet, by A. A. Milne (1936), was also based on the novel. A film version, 1940, starred Greer Garson and Laurence Olivier.

Prideaux, HUMPHREY (1648-1724). British Orientalist and divine. He was born May 3, 1648, at Padstow, Cornwall, and educated at Liskeard and Bodmin grammar schools, at Westminster, and at Christ Church, Oxford, where he was distinguished for his scholarship. In 1681 he became canon of Norwich, and during 1688-94 was archdeacon of Suffolk. He succeeded Fairfax as dean of Norwich in 1702, died there, Nov. 1, 1724, and is buried in the cathedral. Among his works are *Life of Mahomet*, 1697; and *The Connection*, 1717-18.

Prie-Dieu (Fr., pray God). Small wooden desk for prayers. It has a cushioned kneeling-piece and a sloping shelf for books. The name came into use in the early 17th century. See *Faldstool*.

Priego de Cordova. Town of Spain, in the prov. of Cordova. It stands in a fertile plain, 47 m. S.E. of Cordova, and has a 13th century church. Industries include tanning and the manufacture of cotton and silken goods, rugs, and esparto fabrics, while a thriving trade is carried on in oil, wine, cattle, horses, and mules, for which the district is noted. A Moorish stronghold, Priego was captured by the Christians in 1226, retaken by the Moors, and finally reconquered in 1407. Pop. 18,700.

Priessnitz, VINCENTZ (1799-1851). A German hydropathist. Born at Gräfenberg, Silesia, Oct. 5, 1799, he became a farmer. Having obtained the idea of the water cure for illness, he practised it on his animals and then on himself. So successful was he that he extended his farm buildings to form a hydropathic establishment, the precursor of many others. He died Nov. 28, 1851. The system of Priessnitz consisted essentially in the application of cold water to all parts of the body by bandages and other devices, supplemented by careful diet, exercise, and fresh air.

Priest (Gr. *presbyteros*, elder). Term for a member of the second order of the Christian ministry.

The original signification of the word, which is used in connexion with officiating ministers in pagan temples as well as in Christian churches, though not in the Free churches, is doubtful; but it is used by the English translators of the O.T. as an equivalent of the Hebrew *cohen*, which implies one who stands as mediator between his fellow-men and God. In the N.T. the translators also use the word priest as an equivalent of the Greek *hiereus* (Lat. *sacerdos*), sacrificing priest. Though in common use at the beginning of the 3rd century, the word priest (*hiereus*) is not applied in the N.T. to a Christian minister as distinct from the Christian people. It occurs, however, in reference to Jewish priests, to the priest of Jupiter at Lystra (Acts 14, v. 13), and to our Lord (Heb. 7, vv. 16-17; 8, v. 4). See *Clergy*; *High Priest*; *Holy Orders*; *Minister*; *Sacerdotalism*.

Priest Gun. Self-propelled British gun used in the Second Great War. It was a 105-mm. high-velocity gun-howitzer, on a General Grant tank chassis. First used by the 8th army at Alamein, it was decisive against the German 88-mm. anti-tank gun.

Priestley, JOHN BOYNTON (b. 1894). English critic, novelist, and playwright. He was born Sept. 13, 1894, son of a Bradford schoolmaster, and was educated there and at Trinity Hall, Cambridge, also serving in the First Great War. His literary career



J. B. Priestley, English writer

opened with verses, *The Chapman of Rhymes*; reputation grew with *Brief Diversions*, 1922; two short novels published in 1927; and studies of Meredith and Peacock; then in 1929 *The Good Companions* (*g.v.*) proved a best-seller, ranked by some as a picaresque novel in the Fielding tradition. Next year came *Angel Pavement*, a sombre masterpiece of middle-class life in London, and there were later novels of the same length and style.

Priestley's first play, and one of his best, was *Dangerous Corner*, 1932. He succeeded with pure comedy in *Laburnum Grove*, 1933. After coming out as a writer with social purpose in *English Journey*, 1934, he launched a memorable series of plays presenting aspects of the problem of time, in which he owed much to the

theories of Ouspensky and J. W. Dunne. Time and the Conways (1937), I Have Been Here Before (1937), and Johnson Over Jordan (1939) brought him to the Second Great War, and Music at Night was the first new play put on in the London black-out.

During and after the war Priestley's plays and novels revealed an intense concern with the lives and aspirations of those who were fighting, waiting at home, or planning a new society. They Came to a City, 1943, was a symbolic drama, but Desert Highway was set in Libya, and the story Three Men in New Suits dealt with the adjustment of servicemen to civilian life. The Linden Tree, 1947, showed that while strongly Left-wing himself, Priestley could create sympathetic stage characters to speak for the other side.

A man of diverse activities, he excelled as a broadcaster, either of entertaining causeries or of postscripts to news when it seemed dark in 1940. Books described as chapters of autobiography gave interesting glimpses into his method of work. If there may be found one quality common to all Priestley's writing, that quality is humanism.

Alan Phillips

Priestley, JOSEPH (1733-1804)
British chemist and divine. Born at Birstall, Yorks, March 13, 1733,



Joseph Priestley,
British chemist

he was educated at Daventry for the Nonconformist ministry. In 1755 he became minister of a church at Needham, removing to Leeds in 1767 and to Birmingham in 1780. During all his life he held theological views in advance of the time; but it is as a scientist that Priestley is remembered. He early took an interest in chemistry and electricity, and in 1767 published his History of Electricity. He carried out brilliant but unmethodical experiments with electricity, 1761-70, suggesting explanations of certain phenomena which required a century to pass for final proof.

Turning his attention to chemistry, in 1772 he read his paper on Different Kinds of Air, in which he announced the discovery of hydrochloric acid and nitrous oxide. This paper contained a suggestion for saturating water with carbon dioxide which led to a new in-

dustrial process in the manufacture of mineral waters. His remarkable discovery of oxygen in 1774 followed, one of the landmarks in the history of chemistry. Priestley was a strong advocate of the phlogiston theory, and this prevented him from realizing the full value of many of his discoveries. Sulphur dioxide, silicon tetrafluoride, and other gases were discovered by Priestley, who showed their effect on plants and animals.

Politically a reformer, Priestley was known to be sympathetic to the French Revolutionaries, and on July 14, 1791, a mob in Birmingham attacked his house and chapel, destroying records and instruments. Joining his sons in America in 1795, he died Feb. 6, 1804, at Northumberland, Pa. His Works were edited by J. T. Rutledge, 1817-32. There are Lives by J. Corry, 1804; A. Holt, 1931.

Priluki. Town in the Chernigov region of Ukraine S.S.R. It lies 150 m. N.W. of Poltava, on the Udai, and on a branch line of the Kiev-Voronezh rly. Overrun by the Germans during the Second Great War, Sept., 1941, it was recaptured by the Russians, Sept. 17-18, 1943. Considerable trade was carried on in grain and cattle, and there were tobacco plantations in the neighborhood.

Prim, JUAN, MARQUIS DE LOS CASTILLEJOS, COUNT DE REUS (1814-70). Spanish soldier. Born Dec. 6, 1814, he spent his youth under arms, but was exiled by Espartero in 1839. Four years later he was instrumental in causing that minister's downfall, but was again exiled shortly after, living in England and France until his return to Spain in 1847. His military services, 1847-60, were rewarded with a marquessate, but in 1868, angered at Queen Isabella's favouritism to the Jesuits, he and Serrano led an insurrection, the latter being declared regent. On the election of Amadeo, duke of Aosta, to the Spanish throne, Prim was assassinated, Dec. 30, 1870.

Primage (Lat. *premium*, reward). Term used in shipping for an allowance made by the shipper to the captain of the vessel for the use of the tackle, etc., in loading and unloading cargo. Now simply any addition to the quoted rate of freight, usually to repay the captain for his care, its amount varies from port to port and also in different trades.

Primaries. Word used in the U.S. A. to denote those elections by which members of the great political parties choose their candidates for

public office as well as their delegates to party functions. The primaries, though purely party matters, are regulated by laws varying from state to state, but usually laying down the definition of a party, the rules determining its membership, the method of balloting, dates, polling places, payment of expenses, etc.

Oregon passed a law in 1910 instituting a primary election of delegates to the party conventions which choose the presidential candidates. Progressive elements in both parties adopted the idea, and by 1916 such primaries were held by law in 24 states. By 1948 they were held in only 14 states.

Primary Rocks. Those ranging from the Cambrian period in geology to the Permian period; perhaps from 500 million to 200 million years ago. They are well represented in the British Isles. For fuller treatment, see Geology.

Primate (Lat. *primus*, first). In England, term applied to the archbishops of Canterbury and York. It means the bishop highest in rank in a nation or province. In the R.C. church primates are bishops to whose see the dignity of vicar of the Holy See was formerly attached, these including Arles, Armagh, Gran, Lyons, Mainz, Pisa, Salerno, and Toledo. See Archbishop; Canterbury; Exarch; Metropolitan.

Primates (Lat., *primus*, first). Highest order of the mammalia. It is divided into three sections, the Lemuroidea, which include the lemurs; the Tarsiodea; and the Anthropoidea, which include the monkeys, apes, and man. These sections are regarded as distinct orders by some authorities. With the single exception of man, all members of this order are inhabitants of tropical and sub-tropical countries, and are arboreal in habit, though some baboons are more usually found among rocks than in trees. Hence they are essentially climbing animals, and the four feet are adapted for grasping, whence the old name of quadrumana or four-handed animals; where there is a tail it is generally prehensile for the same reason.

Except in man, the great toe is opposable to the others, but the thumb is often imperfectly so. The upper halves of the limbs are free from the body and not embedded in it, as in the ungulates and others. The fingers and toes do not taper to a point, but are more or less broad at the tip and bear a nail instead of a claw.

Another notable distinction is that the eyes are brought round to the front of the head, and not placed at the sides. The mammae or teats are normally only two in number and are situated on the breast, and never on the abdomen. In the higher primates, a more or less erect attitude has been adopted; and in man the brain has been greatly developed both in size and in elaboration of structure. The dentition differs essentially from that of both carnivores and herbivores, and is indicative of a mixed diet. *See* Animal; Mammal.

Prime Meridian. Zero longitude from which all meridians are reckoned or numbered E. and W. The choice of meridian is arbitrary, but international agreement in 1884 selected that of Greenwich. *See* Longitude.

Prime Minister. Head of the British government and the principal adviser of the sovereign, called also the premier. He must be a member of parliament and enjoy the confidence of a majority of the house of commons, and through them that of the country. Under the party system, he is also the leader of his own party. His powers are enormous, as he selects the cabinet, advises the sovereign when to dissolve parliament, and exercises patronage.

Sir Robert Walpole is generally regarded as the first prime minister, the evolution of this office being due to George I's unwillingness to attend cabinet meetings because of his ignorance of the language. Since Walpole's time the power and prestige attached to the office have steadily increased. In the constitution the position of prime minister was unknown, and the holder, therefore, always had in addition some other office, usually, but not always, that of first lord of the treasury. In 1905 Edward VII recognized the existence of the position, and gave the prime minister precedence on state occasions immediately after the archbishop of York.

The Ministers of the Crown Act, 1937, which provided for the payment of a salary of £10,000 and a pension of £2,000 to the prime minister, was the first statutory recognition of his existence. Salisbury, 1895-1902, was the last premier to be in the house of lords; since his time peers have been tacitly disqualified, as was seen in 1923, when Bonar Law was succeeded not by Lord Curzon but by the far less prominent Baldwin.

There is a tendency for the prime minister to perform a dual rôle, to be the head of the government, representing only one party or a coalition of parties, and also to be the adviser of the sovereign in his relations with the self-governing dominions, each of which has its prime minister.

PRIME MINISTERS SINCE 1721

1721-42	Sir Robert Walpole.
1742-44	Lord Carteret, later Earl Granville.
1744-54	Henry Pelham.
1754-56	Duke of Newcastle.
1756-62	William Pitt (later Earl of Chatham) and Duke of Newcastle.
1762-63	Earl of Bute.
1763-65	George Grenville.
1765-66	Marquess of Rockingham.
1766-67	Earl of Chatham.
1767-70	Duke of Grafton.
1770-82	Lord North, later Earl of Guilford.
1782	Marquess of Rockingham (2nd time).
1782-83	Earl of Shelburne, later Marquess of Lansdowne.
1783	Lord North (2nd time).
1783-1801	William Pitt, the younger.
1801-04	Henry Addington, later Viscount Sidmouth.
1804-06	William Pitt (2nd time).
1806-07	Lord Grenville.
1807-08	Duke of Portland.
1809-12	Spencer Perceval (assassinated).
1812-27	Earl of Liverpool.
1827	George Canning.
1827-28	Viscount Goderich, later Earl of Epsom.
1828-30	Duke of Wellington.
1830-34	Earl Grey.
1834	Viscount Melbourne.
1834-35	Sir Robert Peel.
1835-38	Viscount Melbourne (2nd time).
1841-46	Sir Robert Peel (2nd time).
1846-53	Lord Russell, later Earl Russell.
1852	Earl of Derby.
1852-55	Earl of Aberdeen.
1855-58	Viscount Palmerston.
1858-59	Earl of Derby (2nd time).
1859-65	Viscount Palmerston (2nd time).
1865-68	Earl Russell (2nd time).
1868-69	Earl of Derby (3rd time).
1869	Benjamin Disraeli, later Earl of Beaconsfield.
1869-74	W. E. Gladstone.
1874-80	Earl of Beaconsfield (2nd time).
1880-85	W. E. Gladstone (2nd time).
1885-86	Marquess of Salisbury.
1886-91	W. E. Gladstone (3rd time).
1886-92	Marquess of Salisbury (2nd time).
1892-94	W. E. Gladstone (4th time).
1894-95	Earl of Rosebery.
1895-1902	Marquess of Salisbury (3rd time).
1902-05	Arthur Balfour.
1905-08	Sir H. Campbell-Bannerman.
1908-16	H. H. Asquith, later Earl of Oxford and Asquith.
1916-22	David Lloyd George, later Earl Lloyd-George.
1922-23	Andrew Bonar Law.
1923-24	Stanley Baldwin, later Earl Baldwin.
1924	J. Ramsay MacDonald.
1924-29	Stanley Baldwin (2nd time).
1929-35	J. Ramsay MacDonald (2nd time).
1935-37	Stanley Baldwin (3rd time).
1937-40	Neville Chamberlain.
1940-45	Winston Churchill.
1945-	Clement Attlee.

From the above list it will be seen that Walpole was continuously prime minister for a longer period—21 years—than anyone else. The younger Pitt was premier for 18 years, and Lord Liverpool for 15 years continuously. No one save Gladstone has held office four times.

Prime Number. Term in mathematics to denote any number which is indivisible without a remainder, save by itself and unity. Thus 1, 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, and 37 are prime numbers, whereas 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, and 20 are composite because they can be re-

solved into factors. When an odd number exceeds four figures it is difficult for any but a mathematician to decide whether or not it is prime. For example, 36,087 is a composite number with factors 3 and 12,029, whereas 36,083 is a prime number. There is no limit to the size of prime numbers and the largest so far worked out is 170,141,183,460,469,231,731-687,303,715,884,105,727; it was established by the French mathematician E. Lucas in 1876. *See* Mathematics.

Primer. Device for igniting an explosive charge. It consists of a small quantity of an easily detonated substance which will explode a large quantity of a less easily detonated material. Dry gun cotton packed in a varnished paper envelope may thus be used to explode the main charge, which is wet gun cotton. The primer may be activated electrically or by percussion or friction fuses. (*See* Ammunition; Cartridge; Explosive; Explosives; Ordnance.)

The word is also used for a small elementary book for children to read and hence for any small book dealing with elementary principles, e.g. a primer of grammar.

Prime Vertical. Name given to the vertical circle perpendicular to the meridian. It passes through the E. and W. points of the horizon and the zenith (*q.v.*).

Priming. In oil painting, the coating of a canvas or panel with size, so as to form a ground for the colours. The Van Eycks used a pure white gesso ground, but later priming mixtures formed of white lead, various oils, and earths were light grey or even brightly tinted. Opinions differ as to how far the colour of the ground affects the brilliancy of the picture, but it is usually held to correct the subsequent darkening of the oil. *See* Painting.

Priming. Engineering term. When particles of water, suspended in steam, pass out of a boiler into a steam pipe, the boiler is said to be priming. With most boilers working at or near full capacity, water is carried into the steam space with the steam issuing from the water surface or from the tubes. Baffles are fitted to trap the larger particles, but a certain amount of water in the form of a fine mist escapes. Sudden demands for an excessive quantity of steam will usually cause priming. Unless a superheater is fitted to the boiler, a separator should be fitted in the steam pipe.

Primitive Methodists. Body of Methodists. They arose as the result of difference of opinion on the subject of camp meetings, a species of open-air revival services long popular in America, especially among the negroes. In the opening years of the 19th century they were introduced into Staffordshire by an American Methodist named Lorenzo Dow, the first camp meeting being held in 1807 and speedily followed by others.

Most conspicuous among the organizers and leaders was Hugh Bourne, a Methodist local preacher, who was joined by several energetic preachers of like mind. They founded a new denomination, which soon included 16 congregations and 28 preachers in Lancashire and Cheshire. The name Primitive Methodist indicated that the new body sought to revive the primitive fervour of the early Methodists under Wesley.

The new connexion grew with remarkable rapidity, and within 30 years numbered 36,000 adherents—more than the original Methodists had numbered after 30 years of Wesley's preaching and organizing. Within 30 years it had spread over Great Britain and had sent its agents to the U.S.A. and Canada. For many years it had to face keen opposition from Wesleyans and others, and often its preachers were imprisoned. In 1844 it first extended its work to the foreign field, and in 1870 its African mission was started. After the death of Bourne in 1852, the connexion was reorganized and was for some years administered in seven districts; not until 1902 did the body unify and consolidate its system of government.

Statistics for 1923 showed a membership of 210,923, with 1,091 ministers and 13,939 local preachers, chapels numbering 4,405. In 1932 the Primitive Methodists, United Methodists, and Wesleyan Methodists united as the Methodist Church. *See* Methodism.

Primo de Rivera y Orbaneja, MARQUIS DE ESTELLA, MIGUEL (1870–1930). Spanish statesman. Born at Jerez de la Frontera, Jan. 8, 1870, he was educated at the military academy, Madrid and, commissioned in 1890, first saw action in Morocco in 1893.

He served in the Philippines and in Morocco until 1915, when he returned to Spain as governor of Cadiz. He was removed from office a year later for criticising military mismanagement. In 1921 he was elected to the Cortes, where he advocated withdrawal

from Morocco. In 1922 he was appointed military governor of Barcelona, and in 1923 led a revolt, whereupon King Alphonso XIII appointed him president of a military directorate and suspended the constitution.

Primo de Rivera secured his position by proclaiming martial law throughout Spain and formed a government in which he was the only minister, departments being headed by permanent officials. He visited Italy and formed in Spain the Union Patriótica, modelled on fascism. In 1924 he took over personal command in Morocco and began a campaign which ended in victory two years later. After 1925, he gradually lost the army's support on which he had depended, and eventually resigned, Jan. 28, 1930. Retiring to Paris, he died there on March 16, 1930. His body was brought to Madrid for burial, and in 1947 was at Gen. Franco's command reinterred at Jerez de la Frontera. *See* Spain.

Primogeniture (Lat. *primus*, first; *genitus*, begotten). Seniority by birth; by extension, the system under which the eldest son succeeds to the entire real estate of a father dying intestate, to the exclusion of all other children. This right of primogeniture in males existed among the Jews, but not among other ancient peoples, nearly all of whom divided the lands equally, some among all the children, some among the males only. It was not part of the Roman law, and was abolished in England in 1925, though it still applies to heritage in Scotland.

It originated in the feudal system, when the honorary feuds, or titles of nobility, created were of necessity made indivisible and inheritable by the eldest son only. The inconveniences resulting from the division of estates, by the consequent division of military services, next led to the establishment of a custom whereby the eldest son inherited the whole of the lands held by his father in military tenure. This rule of inheritance was introduced into England by William the Conqueror. It still remained part of the English constitution that socage fees were divisible among all male children, though knight's fees descended to the eldest son. By the time of Henry III, however, socage lands also had almost entirely fallen into the right of succession by primogeniture, except in certain parts, such as Kent, where the ancient gavel-kind tenure was jealously preserved,

and in some manors and townships, where succession was still determined by local custom.

With regard to females, succession by primogeniture exists only in respect to inheritance of the crown. In respect of female dignities and titles of honour the right of succession, but not of primogeniture, is established. Thus, if a man holds an earldom to himself and the heirs of his body, and dies leaving daughters only, the eldest does not become countess as a matter of course, but the dignity falls into abeyance until the sovereign, as the fountain of honour, confers it upon one of the daughters or her descendant, or the line of one of the daughters dies out. *See* Family; Genealogy; Peerage.

Primrose (*Primula vulgaris*). Perennial woodland herb of the family Primulaceae. It is a native



Primrose. *Primula vulgaris*, flowering in British woods in spring

of Europe and N. Africa, and grows profusely in Great Britain. From the thick, fleshy rootstock the wrinkled and almost stalkless leaves rise in a circle. The long-stalked flowers which appear in April really form an umbel, as in cowslip, but the common flowering stem is suppressed and concealed between the leaves. The funnel-shaped flowers are of a pale yellow tint, and of two forms: in one there is a long style bringing the round stigma to the mouth of the flower-tube, with the stamens half-way down; and in the other the style reaches only half-way up, whilst the stamens partly fill the mouth. This arrangement secures cross-pollination, the long tongue of the bee-fly (*Bombylus*)—the chief pollinating agent—touching both these points in its search for the nectar that lies at the bottom. Pollen is carried from the anthers of the long-styled (called pin-eyed) to the stigma of the short-styled (thrum-eyed), and vice versa.

Primrose Day (April 19). *See* Primrose League.

Primrose Hill. London eminence and open space. Adjoining St. John's Wood and Regent's Park, and covering about 50 acres,

the park, with adjoining property now largely built upon, passed from the leper hospital of S. James to Eton College, and was in the early part of Queen Victoria's reign handed over to the government in exchange for lands at Eton. The summit of the hill, 206 ft., commands one of the finest views in London. The hill preceded Hyde Park as a place of popular assembly. Mother Shipton prophesied that the hill would one day be the centre of London.

Primrose League. A British political organization. It was formed by Conservatives in 1883 on the suggestion of Sir Henry Drummond Wolff, Lord Randolph Churchill, Sir John Gorst, and Sir Alfred Slade, in memory of the earl of Beaconsfield, who had died two years before; and its title (and symbol) was that of the favourite flower of this great statesman. (It has, however, been held by some authorities that when Queen Victoria said of the primrose, "his favourite flower," she was referring not to Beaconsfield but to the Prince Consort.) Though the organization is open to both sexes, the larger part of its membership has always been women, even before their enfranchisement. Women accordingly exercised influence on the Conservative party, with which the Primrose League is closely associated, before they were actively helping any other political party. Primrose Day is April 19, the anniversary of Beaconsfield's death, which is celebrated by decorating his statue in Parliament Square with wreaths of primroses and by a service of remembrance at Hughenden church. The headquarters of the League are at 54, Victoria Street, London, S.W.1.

Primula (Lat. *primus*, first). Genus comprising about 300 perennial herbs of the family Primulaceae (*q.v.*), chiefly natives of hilly districts in the N. temperate regions. Five species are native to Great Britain: primrose (*Primula vulgaris*), cowslip (*P. veris*), oxlip (*P. elatior*), bird's-eye (*P. farinosa*), and Scottish primrose (*P. scotica*). The garden polyanthus is believed to be a hybrid between the cowslip and primrose. Many hardy exotic species are in general cultivation, especially in rock gardens.

The auricula (*P. auricula*) was introduced from the European Alps as far back as 1596. *P. japonica*, perhaps the most beautiful of the hardy species, which succeeds in moist rich loam, has a stem from 1 ft. to 2 ft. high, on which the

white, pink, crimson, or maroon flowers are produced in several whorls. Siebold's primrose, also



Primula. Flowers of *P. obconica*, a greenhouse favourite

from Japan, is another fine plant, with rosy flowers in umbels. Among the greenhouse favourites are the Chinese primrose (*P. sinensis*), with variable lilac flowers, and *P. obconica*, also from China, has drooping purplish flowers. This species must be handled with care, as contact with its hairy leaves produces a troublesome rash on sensitive skins. Seeds of all the kinds should be sown as soon as ripe, in shallow pans of leaf-mould, covered with a sheet of glass and placed in the shade.

Primulaceae. Family of herbs (mostly perennials) including about 550 species. They are natives chiefly of the N. temperate regions, being but slightly represented in the S. and the tropics. The flowers are usually regular, showy, and sweet-scented; more or less tubular, with spreading limb. The fruit is a single-celled capsule. Well-known genera are *Primula*, *Anagallis*, *Lysimachia*, and *Cyclamen*.

Primuline. Yellow aniline dye discovered by A. G. Green in 1887 and used for dyeing cotton. See Aniline.

Primum Mobile (Lat., first source of motion). In ancient astronomy, the tenth or outer sphere of the universe in the Ptolemaic system (*q.v.*). *Pron. mo-bil-ee*.

Primus (Lat., first). Term applied to the bishop elected to preside over the synod of the Episcopal Church of Scotland.

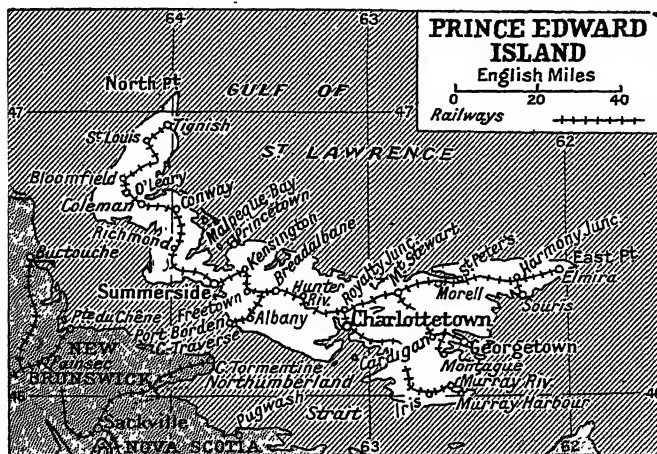
Prince (Lat. *princeps*, chief). Title of dignity. It was first applied in the Roman republic to the *princeps senatus* (the senator who stood first on the censor's list), and was later adopted for the *princeps juventutis* (the first on the roll of the Roman knightly order). The assumption of the style of *princeps senatus* by Augustus asso-

ciated the word with royalty, and thereafter it came to be applied as a title for one of the highest rank, sometimes meaning the sovereign or ruler of a state. In the Holy Roman Empire, the title was given to the heads of all great feudatories, but was later reserved to those entitled to seats in the college of princes. In medieval Italy, many rulers of duchies styled themselves prince, as did those of Rumania, Serbia, Bulgaria, Montenegro, and Albania before adopting higher titles.

After the dissolution of the Holy Roman Empire in 1806, the heads of most German states continued as princes; even after the German federation of 1871, seven states continued to be ruled by princes, though owing fealty to the emperor. German princes without sovereign rights were styled *Fürst*. In Germany and Austria distinguished persons of non-royal blood were sometimes elevated to the rank of prince, *e.g.* Bismarck and Metternich. The title of prince or princess has long been given to sons and daughters of the sovereigns of England, Scotland, France, Spain, etc., and in Russia it was held by heads of the highest families. In Great Britain the children of the sovereign are by courtesy prince or princess, but require a royal warrant to legalise the title, and remain commoners until this is done. The eldest son becomes prince of Wales (*q.v.*). Today the title prince, for head of a state, continues in Monaco and Liechtenstein. A prince of the church is a bishop or archbishop of an R.C. see which has enjoyed sovereign rights.

Prince, THE (Ital. *Il Principe*). Political treatise by Machiavelli (*q.v.*). It was published in Italian and has been translated into English and most modern languages. It outlines the way in which a prince should act, if he wishes to preserve and strengthen his inheritance. The lessons are pressed home with a wealth of illustrations taken from the history of Italy in Machiavelli's own time and of the ancient world. The book is one of the greatest of its kind, for Machiavelli was the first writer to apply the inductive method to politics, and to break with the theories laid down by the Church.

Prince Albert. City of Saskatchewan, Canada. It stands on the North Saskatchewan river, about 200 m. N. by W. of Regina, and is served by C.N.R. and C.P.R. It is the headquarters of the R.C.M.P. for central and N. Saskatchewan.



Prince Edward Island. Map of the smallest province of the Dominion of Canada

There are brickyards, flour mills, and brewing, packing, and lumbering industries. Pop. 14,290.

Prince Albert national park 35 m. N.W. of the town, covering 1,869 sq. m., was opened in 1928.

Prince Albert Peninsula. N.W. projection of Victoria Island, Arctic America. It lies N. of Prince Albert Sound, S. of Banks Strait, and is separated from Banks Land by the Prince of Wales Strait. The coast is indented by Minto Inlet, Collinson Inlet, and Glenelg Bay. Its most N. point is Peel Pt.

Prince Edward. Small island in the Indian Ocean, about 1,200 m. S.E. of Cape Town, in lat. 46° S., long. 37° E. approx. It is 15 m. in circumference. With Marion Island, about 12 m. distant, it was adopted by the South African government in 1947 for strategic and meteorological purposes. It was discovered by Marion du Fresne in 1772.

Prince Edward Island. Island in the Gulf of St. Lawrence, and the smallest and most thickly settled province of the dominion of Canada. The coast is deeply indented, and Northumberland Strait divides it from the mainland. Its area is 2,184 sq. m., and pop. 95,047. Wheat, oats, potatoes, etc., are grown; butter and cheese are made; cattle and horses are reared; and foxes are bred for their fur. Mackerel, cod, oysters, and lobsters are plentiful. The prov. is served by the Prince Edward Island rly., a state concern, now part of the C.N.R. The



province is governed by a legislative assembly of 30 members, elected for four years, and four members are sent to the senate and four to the house of commons of the dominion. Charlottetown is the capital, and Summerside the next largest place. Nearly half the people profess the R.C. faith. Prohibition is retained.

The earliest name of the province, which was discovered by the French, was Île St. Jean. It was French from 1603, when Champlain took possession of it, until the peace of 1763. It then became part of Nova Scotia, and in 1773 a separate colony. About this time it was surveyed, and the land disposed of in grants, much of it to absentees. As a compliment to Edward, duke of Kent, then

governor-general of Canada, the island received its present name. It joined the dominion, after having received certain financial advantages, in 1873.

Prince George. A town of British Columbia, Canada. It is situated at the junction of the Nechako and Fraser rivers, 526 m. N. of Vancouver, on the C.N.R., and is the centre of a mining and lumbering district. Its importance is linked with an extension of the Pacific Great Eastern rly., intended to open up the rich Peace River country. Pop. 2,027.

Prince Igor. Opera by Borodin, consisting of 4 acts and a prologue. It was unfinished at the composer's death, and was completed by Rimsky-Korsakov and Glazounov. It was published by Belaiev in 1889, and later performed at the chief opera houses of Europe and the U.S.A. One of the most robust and strongly nationalist of Russian operas, it is notable for its blending of tragedy and comedy. A ballet based on the well-known Polovtsian dances was first performed by the Diaghilev company shortly before the First Great War.

Princé Imperial. For details of the French prince often given this title, see under Eugène.

Prince of Wales. British title conferred upon the male heir apparent of the sovereign. It was first borne by Edward, eldest surviving son of Edward I, who in 1301 invested his heir with the principality; his motive was probably to placate Welsh feeling after his wars of conquest. It has been wrongly asserted that Mary,

PRINCES OF WALES

	Son of	Created	
Edward	Edward I	1301	Edward II, 1307
Edward, Black Prince	Edward III	1343	Died 1376
Richard	Black Prince	1376	Richard II, 1377
Henry	Henry IV	1399	Henry V, 1413
Edward	Henry VI	1454	Died 1471
Edward	Edward IV	1472	Edward V, 1483
Edward	Richard III	1483	Died 1484
Arthur	Henry VII	1489	Died 1502
Henry	Henry VII	1503	Henry VIII, 1509
Henry	James I	1610	Died 1612
Charles	James I	1616	Charles I, 1625
Charles	Charles I	1630	Charles II, 1660
James, Old Pretender	James II	1688	Exiled 1688
George	George I	1714	George II, 1727
Frederick	George II	1727	Died 1751
George	Prince Frederick	1751	George III, 1760
George	George III	1762	George IV, 1820
Albert Edward	Victoria	1841	Edward VII, 1901
George	Edward VII	1901	George V, 1910
Edward	George V	1910	Edward VIII, 1936 (later Duke of Windsor)

Edward VI, nine years old when his father Henry VIII died, had never been created prince of Wales

daughter of Henry VIII, held the title of princess of Wales in her own right. In order of precedence the prince is second only to the sovereign. The plume commonly called the prince of Wales's feathers is really the badge of the heir apparent, in whom it is vested, whether created prince of Wales or not. This badge consists of a plume of three ostrich feathers enfiled by a coronet of alternate fleurs de lys and crosses patée or, and the motto is *Ich Dien* (Ger., I serve), adopted by the Black Prince in 1346. A list of those who have held the title is given in a table in page 6697. See *Ich Dien*.

Prince of Wales, H.M.S. Former British battleship. One of the five vessels of the King George V class authorised in 1936, she was built during 1937-40. Displacing 35,000 tons on a length of 739 ft. and a beam of 103 ft., she was powered by geared turbines developing 152,000 s.h.p. to give a maximum speed of 30 knots. Her armament consisted of ten 14-in., sixteen 5.25-in., and a number of A.A. guns. She carried four aircraft and a complement of 1,500 men. She took a prominent part in the chase of the Bismarck (*q.v.*) in 1941, and later in the year F. D. Roosevelt and Winston Churchill met on board her in mid-Atlantic for the conference resulting in the signing of the Atlantic Charter (*q.v.*). She was then transferred to the Far East in company with H.M.S. Repulse (*q.v.*). On Dec. 9, 1941, the two warships, with destroyer escort, sailed from Singapore under the command of Admiral Sir T. Phillips to intercept a Japanese convoy. No contact with the convoy was made, and the ships turned back but were spotted by a Japanese aircraft. Shortly before noon (local time) on Dec. 10, a large force of Japanese bombers made an attack and were followed by 27 torpedo-carrying aircraft in three waves. Hits were scored on Repulse and she sank almost at once. A hit on the Prince of Wales put her propellers and steering gear out of action, and after further concentrated attacks she sank at 12.30 p.m. Under cover of British fighters, which arrived after the sinkings, the escorting destroyers rescued 2,300 of the 3,000 men from the two ships. Phillips went down with his ship. The disaster proved that battleships could not operate in narrow waters without adequate air cover, and the loss of the ships, coupled with the Pearl Harbour (*q.v.*) attack, gave Japan virtual control of the Pacific.

Prince of Wales Island. Former name for the island officially called Penang (*q.v.*), in Federation of Malaya. There are also three other islands of this name: (1) The largest island of the Alexander group, S.E. Alaska; length, 135 m.; breadth, 40 m. It has extensive mineral deposits, including gold, silver, copper, and iron. (2) An island of the Malay Archipelago, in Sunda Strait, between Sumatra and Java. (3) A small island in the Low Archipelago, Pacific Ocean.

Prince Patrick Island. Westernmost of the Parry group (*q.v.*), Canada. Situated N. of Banks Island, and W. of Melville Sound, its coasts are deeply indented, especially on the S. and W.

Prince Rupert. Port and town of British Columbia. It stands on Kaizen Island at the mouth of the Skeena river, 550 m. N. of Vancouver. It is a terminus of the C.N.R., and has a fine natural harbour, 14 m. long. There are a floating dry dock, shipyards, elevators, and a fine cold-storage plant. In a mining and lumbering district, Prince Rupert is also the centre of the N. Pacific halibut fishery. Pop. 6,714.

Princes' Islands. Islands of the sea of Marmara, the ancient Demonesi. Nine in number, four of them being inhabited, they lie in the E. part of the sea of Marmara, about 12 m. S.E. of Istanbul. They are famous for their delightful climate. The chief island is Prinkipo (*q.v.*).

Princes Risborough. Market town of Bucks, England. It is 7 m. S. of Aylesbury, near the Chiltern Hills, with a rly. station. The name is due to the fact that the Black Prince had a palace here. The govt.'s forest products research laboratory is here. Pop. approx. 3,500. Monks Risborough, 2 m. to the N., belonged to the archbishop of Canterbury. About 3½ m. N. of Princes Risborough is Chequers (*q.v.*).

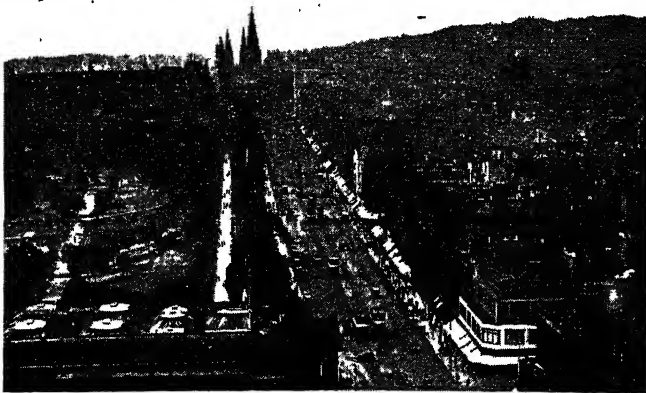
Princess, ТНЭ. Fanciful romantic poem in blank verse by Lord Tennyson, and described in its sub-title as *A Medley*. First published in 1847, it received later additions, notably the lyrics with which, as completed, it is interspersed. Dealing in half-mocking fashion with the movement for women's fuller education and "women's rights," the poem embodies many passages of real beauty. Gilbert and Sullivan's *Princess Ida* (*q.v.*) was a freely adapted musical version of Tennyson's poem.

Princess Charlotte Bay. Indentation of Queensland, Australia. It is situated on the N.E. coast between Capes Melville and Sidmouth, and receives many streams, of which the largest is N. Kennedy river. Between Cooktown land dist. and Cape York peninsula, the bay has no harbours, being N. of the settled area.

Princess Ida, or Castle Adamant. Comic opera by W. S. Gilbert, with music by Arthur Sullivan, produced Jan. 5, 1884, at the Savoy Theatre, London, where it ran for 246 performances. It is a musical and flippant dramatic version of Tennyson's narrative poem *The Princess*, bearing much the same relation to its original as Strauss's musical comedy *The Chocolate Soldier* to Shaw's *Arms and the Man*. It has never ranked high in popularity among the Gilbert and Sullivan operas, possibly because of the difficulty of satirising what was itself satirical, namely the existence of an imaginary stronghold of learned women; but it afforded Sullivan the opportunity of composing some of his most delightful music. The best-remembered song is probably that of King Gama, "The Disagreeable Man."

Princess Royal. Title of dignity sometimes created in favour of the eldest daughter of a sovereign, provided she is not in direct succession to the crown. The first British princess royal was Mary, princess of Orange, so created by her brother Charles II, after his restoration. Charlotte (1766-1828) was given the title by her father, George III; Princess Victoria (1840-1901) by her mother, Queen Victoria; and Princess Louise (1867-1931) by her father Edward VII. Princess Mary, Viscountess Lascelles, was created princess royal by her father, George V, on Jan. 1, 1932. The title is held for life, irrespective of the death of a sovereign; thus Princess Louise remained princess royal until 1931, and only on her death was the title available to be conferred on Princess Mary.

Princes Street. Principal thoroughfare of Edinburgh, Scotland. Originally called Lang Gait (Long Walk), it is about a mile long and was renamed in honour of the two elder sons of George III. Running from E. to W., it has continuous buildings on the N. side only, the S. side being occupied by W. and E. Princes Street Gardens, from which (on the other side of a rly. cutting running parallel to the street)



Princes Street, Edinburgh. The western half of this famous mile-long thoroughfare, looking W. towards the spires of St. Mary's Cathedral. The dome, right, is that of St. George's Church

rise the Castle and the long line of the Old Town. At the E. end is the Waverley rly. station and the Waverley market; at the W. end is Princes Street rly. station. In E. Princes Street Gardens are statues of Livingstone, Christopher North (John Wilson), and the Sir Walter Scott Monument, the last-named being surmounted by a Gothic spire 200 ft. high. On the Mound which separates E. and W. Princes Street Gardens is the Scottish national gallery. The Mound itself was made from earth excavated during the building of the New Town.

Prince Steamship Line. British steamship company. Founded in Newcastle-upon-Tyne, 1883, its vessels all bear a second name of Prince, e.g. Spanish Prince. Regular services are maintained between Manchester and N. African ports; Tyne, Antwerp, and London and N. African ports, also S. America. Vessels of this line also ply between New York and S. America, S. Africa, and the Far East.

Princes Theatre. London playhouse, in Shaftesbury Avenue, W.C.2. Opened Dec. 26, 1911, by W. F. Melville, with a performance of *The Three Musketeers*, it became a favourite centre for musical plays, comedies, and farces, seating 1,850 spectators, with a particularly large gallery known as the amphitheatre.

Princeton. Bor. of New Jersey, U.S.A., in Mercer co. It is 10 m. N.N.E. of Trenton, and is on the Pennsylvania rly. and the Delaware and Raritan canal. The seat of Princeton university and of the Institute for Advanced Study (where Einstein worked from 1933), it has also a theological seminary (S. Joseph's College) and the Rockefeller medical research institute.

Princeton was the scene in 1777 of a success by Washington over a British force. Congress sat temporarily in 1783. Pop. 7,719. Another Princeton is a small city in Indiana; pop. 7,786.

Princeton University. Educational institution of the U.S.A., situated at Princeton, N.J. It was founded as the College of New Jersey, at Elizabethtown, in 1746; moved to Newark, 1748, and to Princeton, 1756. The buildings suffered severely during the War of Independence, but were rebuilt and extended throughout the 19th century. Nassau Hall was founded in 1756, and there are more than a dozen dormitory halls, together with museums, laboratories, stadium, etc. John Gunther has called this "the most sophisticated of all American universities," and its record is outstanding in scholarship and sport. Though it is undenominational, all its presidents have been Presbyterians. Among them was Woodrow Wilson. No negro has ever been admitted to the university. The professional staff numbers about 365, and the students exceed 2,800. Consult Princeton 1746-1896, T. J. Westenbaker, 1947.

Princetown. Village of Devon, England. It stands on the W. side of Dartmoor, 15 m. N.E. of Plymouth, and is served by branch rly. The existence of the place is due to the prison opened here in 1809; now it is also a holiday centre. See Dartmoor Prison.

Princip, GAVRILO (1894-1918). Assassin of the archduke Ferdinand and his wife at Serajevo, June 28, 1914. Born July 13, 1894, in Grahovo, Bosnia, Princip had been a student of Belgrade university. Princip, who fired the fatal shots, acted in concert with

Chabrinovich, who threw the bomb which missed the royal pair, and it was suspected that the young men were the agents of persons engaged in a wider conspiracy. This crime precipitated the First Great War. Princip and Chabrinovich were sentenced to twenty years' penal servitude, and the former died from tuberculosis at the fortress of Theresienstadt, near Prague, May 1, 1918.

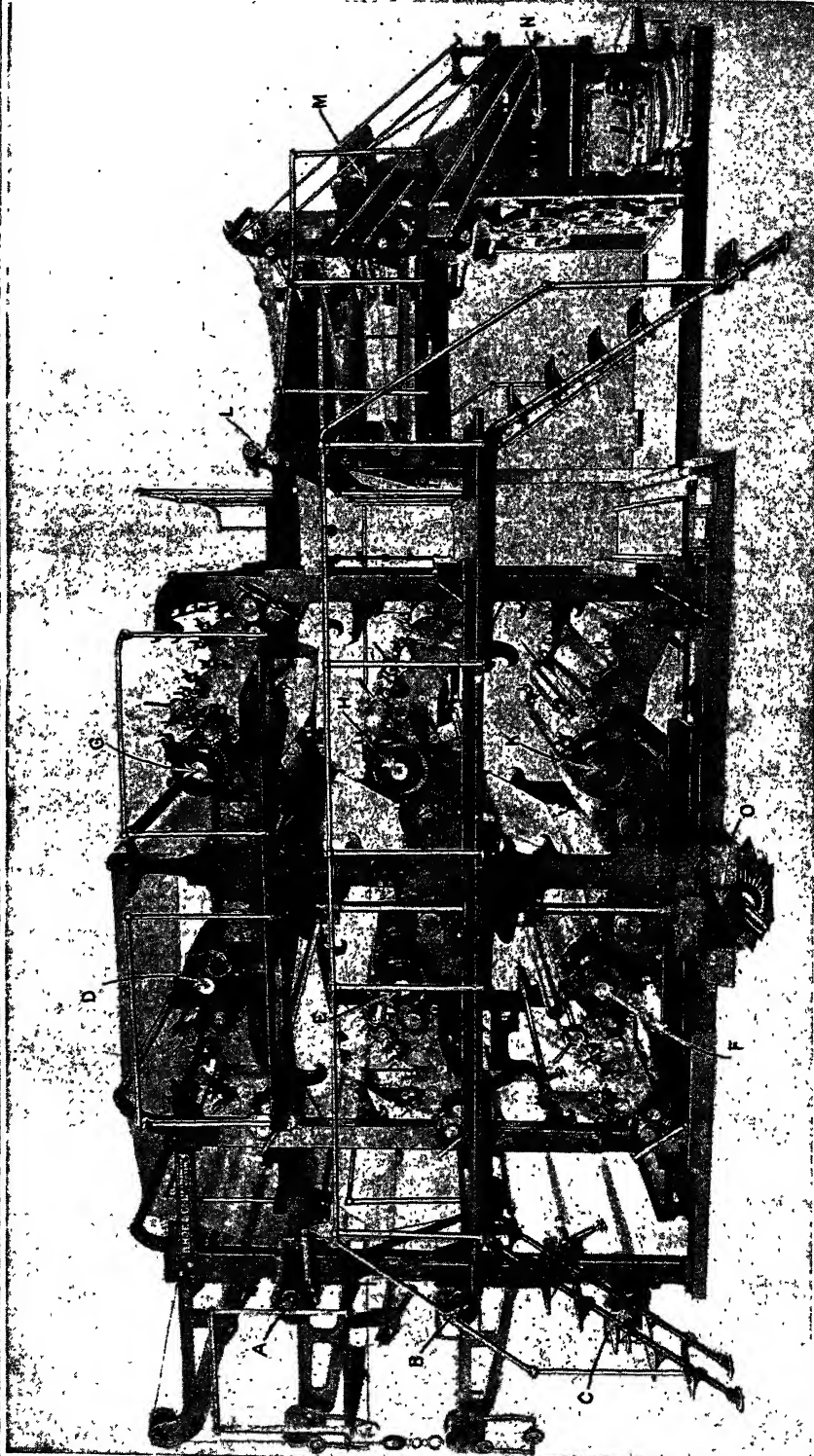
Principal (Lat. *princeps*, chief). In general, one who is chief and is entrusted with the lead. As a title, principal is often used for the head of colleges, seminaries, universities, etc. In finance, the principal is a sum of money which, in an investment, produces interest or revenue.

In law, the principal is the person who commits a crime, whether in the first degree the absolute perpetrator or in the second degree the aider and abettor. Also a person competent to do an act himself and employing another to do it for him is a principal, the other being an agent. A principal is liable to third parties in respect of all acts done by an agent, either upon express authority or instructions, or within the scope of his authority. The maxim applicable is *Qui facit per alium, facit per se*, who acts by another, acts by himself.

Principality. Any territory ruled by a prince, e.g. that of Monaco. In the U.K., "the principality" refers to Wales (sometimes including Monmouthshire), because the title of prince of Wales has for centuries been borne by the king's eldest son.

Principe. Portuguese island in the Gulf of Biafra. It lies midway between the islands of Fernando Po (q.v.) and St. Thomas (q.v.). With the latter it forms a prov. The island is mountainous, and the climate unhealthy. The chief product is cocoa. Pop. 5,000.

Pringle, THOMAS (1789-1834). Scottish poet. Born at Blaiklaw, Teviotdale, Jan. 5, 1789, the son of a farmer, he was educated at Edinburgh university. With James Cleghorn, he edited the first number of the *Edinburgh Monthly Magazine*, which, after Pringle had severed his connexion, became Blackwood's Magazine. In 1820 he emigrated to Cape Colony, but his Whig politics got him into trouble, and in 1826 he was back in London as secretary of the Anti-Slavery Society, a post which he held till his death on Dec. 5, 1834. His earlier poems were issued in 1828, under the title *Ephemerides*, but his finest efforts are to be found in *South African Sketches*. 1834.



Sextuple newspaper press which is capable of printing up to 64,000 twelve-page papers, 26½ ins. by 19½ ins., per hour, folded to half-page size and counted in quires. It will produce papers up to 24 pages at the rate of 32,000 copies per hour, also folded and counted in quires. A, B, C. Reels for paper, G, H, K. Plate-carrying cylinders printing on one side of the paper. D, E, F. Similar cylinders printing on the other side of the paper. G, H, K. Similar cylinders printing on the other side of the paper. N. Folding and counting cylinders, which cut the paper and give to it the final fold before it is delivered to the folding band. The motive power is supplied at O by an electric motor which is situated in a pit under the floor. A sextuple press carries eight plates on each cylinder

After passing G, H, K, the paper from each reel is cut into two-page widths, and the six strips are ganged together at L. M. The "former," which gives the first fold to the sheet. N. Folding and counting cylinders, which cut the paper and give to it the final fold before it is delivered to the folding band. The motive power is supplied at O by an electric motor which is situated in a pit under the floor. A sextuple press carries eight plates on each cylinder

PRINTING: DIAGRAMMATIC REPRESENTATION OF THE ELECTRICALLY DRIVEN ROTARY MACHINE OF A DAILY NEWSPAPER

By courtesy of R. Hoe & Co., Ltd.

notably the well-known lyric, *The Emigrant's Farewell*.

Pringles. Town in Argentina, in the province of Buenos Aires, 304 m. S.W. of the capital, with which it is connected by rly. It is surrounded by a fertile agricultural district. Alt. 900 ft. Pop. 12,000. Another town of the same name is in the province of Río Negro.

Prinkipo (Turkish, Kizil Adasi, the red island). Turkish island in the sea of Marmara. It is the largest island in the group of Princes' Islands (*q.v.*), and came into prominence in 1919 in connexion with a proposed conference, never held, between Soviet Russia and the Western powers.

Prinsep, VALENTINE CAMERON (1838-1904). British artist. Born at Calcutta, Feb. 4, 1838, he studied under Watts in London, and Gleyre in Paris, where he was fellow student with Du Maurier. He is introduced into the latter's *Trilby* as Taffy. One of the Oxford Union frescoists, he drifted away from Pre-Raphaelitism under Leighton's influence. He became A.R.A. in 1878, and R.A. in 1894. He painted history and genre, wrote plays, and was an enthusiastic Volunteer. Val Prinsep died at Kensington, Nov. 11, 1904.

Print. Impression on paper from an engraving on metal, stone, or wood. The chief varieties of engraving are etching, mezzotint, line-engraving, stipple, aquatint, woodcut, and lithograph, each of which will be found described under its title. Prints from engravings are classified as states, and vary with the condition of the engraving at the time of printing; the number of states also varies with individual engravers. Changes constituting a fresh state may take place in the subject, in the handling, or in the lettering, or in all three. Only prints, however, from a completed engraving are recognized as states. It is the first state impression that generally offers the greatest attraction to the collector. In 1847 the Print-sellers' Association was formed in England, with the principal aim of preventing more than a declared number of impressions of each state from being printed.

Print. Term used in photography rather loosely to denote any positive image on a paper or equivalent base for viewing by reflected light. Prints are made from a negative either by contact in a printing frame and exposure to light, or by projection.

Printing-out paper, known as P.O.P., is a photographic printing paper coated with a gelatine emulsion containing silver chloride and silver citrate. First marketed in 1891, it superseded albumen papers but has itself since lost ground to bromide and other development papers. Permanence and a more pleasing colour can be secured by toning with gold and fixing in hypo. Self-toning paper is a variety of P.O.P. containing a gold compound in the emulsion. See *Photography*.

Printemps, YVONNE (b. 1895). French actress. Born at Ermont, Seine-et-Oise, July 25, 1895, she made her début at the Cigale, Paris, in 1908, and later was en-

gaged at the Folies-Bergère. After playing at the Bouffes-Parisiens in *Jean de la Fontaine* by Sacha Guitry (*q.v.*), whom she married (separated 1932), she appeared in many other Guitry productions, scoring a special success in *Mozartin* 1926 (London, 1929),



Yvonne Printemps,
French actress

and in Noel Coward's *Conversation Piece*, in New York, 1934. She became director of the Théâtre Michodière, Paris, where she appeared in *Auprès de ma Blonde*, 1946.

PRINTING: ITS HISTORY AND PRACTICE

For further information on this subject see under Book; Colour Printing; Lithography; Photogravure; Type, etc. See also Intertype; Linotype; Monotype; and the biographies of Caxton, Gutenberg, and other printers

It has long been accepted, though disputed by some, that prints from wooden blocks appeared in Europe in the 6th century from China; but certainly not until the time of Dutch wood-cutters of the 15th century was the idea of duplicating copies by a process of inking the raised surface of a block realized and exploited. It was an easy transition from the cutting of designs upon wood to the cutting of lettering also. The next step was the making of movable wooden types. The movable metal types cast from matrices or moulds appeared between 1440 and 1450.

The invention of printing came at a time when calligraphy was at its best. Excellent models existed at the time both for the form of lettering (the early types were quite naturally modified imitations of the written script) and for the arrangement of the printed page. Nothing finer has been produced than the Gothic type "42 line" Bible of 1455, attributed to Gutenberg of Mainz, with its illuminated initials.

Of the great early printers, Peter Schöffer, also of Mainz, to whom the invention of cast type is attributed, and who introduced a more legible simplified Gothic type; Sweynheim and Pannartz, of Subiaco, whose type showed the transition from the Gothic to the Roman used first by Adolf Rusch; and the Frenchman, Nicolas Jensen, working at Venice about 1470, all deserve special recognition for their share in the development of the art and craft of printing. The Englishman, William Caxton, who possibly

learned his printing at Cologne and certainly printed at Bruges, began work, near Westminster Abbey, in 1476-77, which was continued after his death by his foreman, Wynkyn de Worde. To Germany and, some way after, to Italy, in the 15th century, must be given the greatest share of credit. There were but 12 English towns with presses in the 16th century to the 20 of Germany and the hundred of Italy. Early in the 16th century France took the lead; and afterwards the religious persecution in France drove some of the finest French printers into the neighbouring countries. Plantin (*q.v.*), of Antwerp, is the most famous of these refugees. The appearance of the *Italic* type, the sloping letter supposed to have been modelled on the handwriting of the poet Petrarch and first used by Aldus of Venice in his *Virgil*, 1501, deserves to be noted.

The 17th and early 18th centuries may be considered the period of decadence in printing. To the Englishman Baskerville must be attributed the over-emphasis upon the "thicks" and "thins" of letters, an example widely imitated on the Continent, as by Bodoni and Didot. But Baskerville's contemporary, William Caslon, the type-founder, designed a beautiful font in the older tradition.

While England can claim no considerable share in the early development of printing, she has made amends in the modern revival through the work of the Kilmesscott Press and other famous private presses of the late 19th and early 20th centuries.

PRINTING PROCESSES. Printing may be defined as a process for multiplying copies of an original by inking a prepared surface and transferring the impression to paper or other material. There are three processes, determined by the nature of the printing surface :

(1) Relief or surface printing, for which a general term is found in letterpress printing. In this, as the various terms imply, the printing surface is raised. The most familiar example is the ordinary rubber stamp, which, being inked from a pad, is then impressed upon the paper. By far the greater volume of printing is produced by the letterpress process. It is indeed the normal method of book and newspaper production.

(2) The intaglio process. Here the ink is forced into excised lines or hollows cut or etched in the plate. The paper is then pressed down into the plate and so takes up the ink. A common example is the copperplate visiting card, on which the finger can detect a perceptible raised lettering as contrasted, say, with the letterpress effect of a page of this Encyclopedia. Rotary photogravure is a mechanical development of intaglio printing. (See Photogravure.)

(3) Flat surface, planographic, or lithographic printing. (See Lithography.)

There are, besides, variations of these main processes, e.g. the offset (*q.v.*) process.

LETTERPRESS PRINTING. The main material consists of movable types and blocks or plates, or stereotypes and electrotypes moulded from them, the printing surface being in relief or raised.

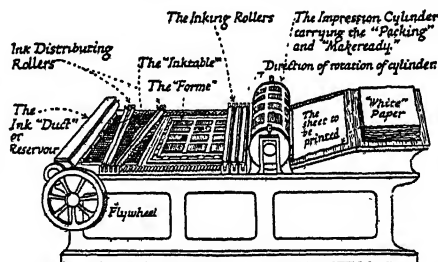
The arrangement of type and the general preparation of the printing surface before it goes to the machine is included under the heading of composition. Composition is of two kinds, hand setting and machine setting.

For hand-set work, the compositor stands at a high desk, on which are arranged, one above the other, two cases divided into compartments containing metal letters. The upper case contains the capital letters; the lower, nearer to the operator's hand, contains the more frequently used small letters. The position of the letters in the cases is dictated by the frequency with which they are required. The cases contain, besides letters with a printing surface, metal blanks, called "spaces" and "quads," to place between the words and at the ends of short lines. The compositor, holding in

his hand a metal case, called a composing stick, or setting stick, gauged to the width of the panel of type decided on for the page, picks the letters one by one from his cases, and sets them upside down from left to right, his first line of type being at the bottom of the stick. The type is transferred from the setting stick to trays of metal, called galleys. From these galleys rough proofs are taken on long strips of paper called galley proofs.

When the matter in galley form has been corrected, the compositor makes up the pages. He arranges or "imposes" them, together with any engraved plates or blocks of pictures, or plans which are to be used, in an iron frame or "forme," in such a way that they fold in proper sequence, with accurate allotment of marginal spaces. These spaces are allowed for by the insertion of metal or wooden blocks, called "furniture."

If two or more colours are to be used in the printed page, their accurate adjustment or "register" is a matter of peculiar delicacy.



Printing. Diagram showing the main features of a single cylinder flat-bed press

With regard to machine composition, the types of machine in most common use are the linotype, the intertype, and the monotype; the first two generally used for newspapers, the latter mainly for book and magazine printing. (See Intertype; Linotype; Monotype.)

MACHINING. The chief features of a flat-bed printing machine, as used for all printing from the 15th to the 19th centuries are a flat bed on which the frame or "forme" containing the type is placed face upwards, and a folding leaf, holding the paper to be printed, which lowers it on to type that is inked either with the old inking ball or the more modern hand ink-roller. Pressure is then applied by lever and screw to a plate or platen of metal, which forces the paper on to the type, and so transfers the impression.

The first radical mechanical innovation was that of König, in

1811. In König's machine the paper is applied to the forme by means of a revolving cylinder, which holds the paper in its passage across the type. This is the normal type of machine employed for the production of book printing today. Modern machines on this principle are fitted with an auxiliary attachment which feeds sheets into the machine automatically, and will produce 1,000 sheets per hour, 65 ins. \times 45 ins., in two colours simultaneously. The introduction of the impression cylinder developed speed. The modern newspaper press proceeds with that development by the addition of a plate-carrying cylinder.

Of the flat forme a mould is taken by laying a thin sheet of a tough, clayey cardboard ("dry flong") over the type, and passing it through the mangle; under enormous pressure it takes an impression of the matter in the forme. This is then dried and fitted into a curved casting box of the auto-plate machine, which produces a replica of the forme in the shape of a metal plate, semi-cylindrical in form. This, with similar plates of the other pages, is attached to the type cylinder, and the huge machines are ready to be set in motion.

In practice, a modern newspaper press is a composite machine with many replicas of the type matter and cutting and folding apparatus, producing completed copies at several delivery points at from 60,000 copies per hour. The ink is pressed into the ink ducts through tubes connected with an ink reservoir overhead. The paper spool unwinds itself into the machine, the paper passing between the type and impression cylinders (each pair printing one side of the paper), and so through into the cutting and folding gear. The whole machine is electrically operated, being put in and out of action by control push-buttons.

Bibliography. The Art of the Book, Studio Special Number, 1912; Modern Printing, J. Southworth, 2 vols., 1914; The Printed Book, H. G. Aldis, 1916; Printing for Business, Joseph Thorp, 1919; The Practice of Typography, T. L. de Vinne, 4 vols., 1920-21; A Brief Survey of Printing, S. Morison and N. Jackson, 1923; Gutenberg to Plantin, G. Winship, 1926; Print-

ing: a Short History, ed. R. A. Peddie, 1927; Printers and Printing, D. Pottinger, 1941.

Printing House Square. London square. It is at the E. end of Printing House Lane, Blackfriars Lane, E.C.4. Since 1788 occupied by the printing office of The Times (*q.v.*), its name is due to the existence here, from the time of Charles II until 1770, of the king's printers. Part of the Roman wall was uncovered here in 1849.

Prinz Eugen. Former German cruiser. A vessel of the Hipper class, she was built during 1936-38. Displacing 10,000 tons on a length of 639 ft. and a beam of 69 ft., her engines developed 80,000 s.h.p. to give her a maximum speed of 32 knots. Her armament consisted of eight 8 in., twelve 4.1 in. and twelve 37 mm. guns, and she carried twelve 21 in. torpedo tubes and four aircraft. During 1939-40 she made a number of raids in the Atlantic, and was with the Bismarck (*q.v.*) when the latter was sunk in 1941. Escaping to Brest, she later accompanied the Scharnhorst and Gneisenau (*q.v.*) in their dash up the English Channel in 1942, being later damaged on several occasions off the German and Norwegian coasts. She was then confined to port. At Copenhagen when the war in Europe ended, the Prinz Eugen opened fire in support of German troops before surrendering. Transferred to the U.S. Navy, she was one of the ships used in the Bikini Atoll (*q.v.*) atomic bomb experiments, and although surviving both explosions her stern plates were damaged and she capsized and sank in Kwajalein lagoon on Dec. 16, 1946.

Prior. Ecclesiastical title for the member of a monastic establishment second in rank to the abbot, or, where there is no abbot, the head of the establishment. The original term was *praepositus*, provost. The prior is generally entrusted with the discipline of the monks, management of property, etc. The position of the prioress is a corresponding one in women's orders. The house over which a prior or prioress presided was known as a priory. *See* Abbey; Monastery.

Prior, MATTHEW (1664-1721). English poet and diplomatist. Born probably at Wimborne Minster, Dorset, July 21, 1664, the son of a joiner, he went to Westminster School and St. John's College, Cambridge, of which he became a fellow in 1688. This fellowship he retained until his death. Friend of

Bolingbroke, Gay, Swift, and Arbuthnot, Prior spent the greater part of his life in the diplomatic service, at The Hague and in Paris. The treaty of Utrecht, 1713, was familiarly known as Matt's peace. He was on good terms with William III and Louis XIV, was M.P. for



Matthew Prior

East Grinstead in 1701, succeeded Locke as commissioner of trade, 1700-07, and was commissioner of customs, 1711-14. At first an adherent of the Whigs, he joined the Tories in 1702. During 1715-17 he was imprisoned in the Tower on a charge of treasonable intrigue in connexion with the treaty of Utrecht.

In 1719, by the assistance of friends, he brought out a sumptuous folio edition of his poems, which brought him 4,000 guineas. To this Lord Harley added an equal sum for the purchase of Down Hall, near to Hatfield Broad Oak, Essex, where Prior henceforth chiefly resided. He died while on a visit to Lord Harley at Wimpole, Cambridge, Sept. 18, 1721, and was buried in Westminster Abbey.

As writer of *vers de société* none perhaps has excelled Prior in humour, grace, ease, and spontaneity. Master of many metres, he liberated English verse from the thralldom of the heroic couplet. Of his two longer works, *Alma*, or The Progress of Mind, modelled on Hudibras, is the more notable. But he is at his best in his epigrams, as that on Bibb and Charon; his verses to children; and in such light verse as The English Padlock, The Garland, and The Female Phaeton (Kitty). His *Tales* are largely lost to the modern reader on account of the change in literary taste. *Consult* Lives, F. Bickley, 1914; C. W. Legg, 1921.

Priority. In general, the state of being antecedent to something else. In loose usage it has come to imply also a relative importance or urgency, the claim to priority arising from such importance being confused with priority itself. Hence its use as a descriptive adjective, as in priority milk, *i.e.* milk for those with an important claim to be served in preference to others in distribution of milk. This usage has naturally grown with the development of controlled

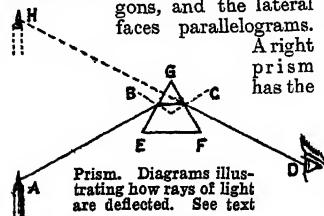
supplies. In English law, the term is used in connexion with the law relating to mortgages and other charges on property. The owner of property may mortgage or charge it as often as he pleases, so long as he can get people to lend him money on it; if he has it is important to know whether one mortgage or charge has priority over another, because when the property is eventually realized there may not be enough to satisfy everybody. As a rule, such charges rank for priority in order of date.

Pripet. River of W. Russia. Rising in the swamps near Pinsk, in White Russia S.S.R., it flows E. across that republic, turns S.E. at Mozir, enters Ukraine S.S.R., and after flowing through vast tracts of almost uninhabited country, the Pinsk or Pripet marshes, falls into the Dnieper, 50 m. N. of Kiev. It is mostly navigable and is connected by canals with the Niemen and Vistula. Its length is about 500 m.

During the First Great War the district was prominent in fighting between the Germans and Russians, engagements taking place at various points, Sept., 1915, a Russian force being driven back to the marshes where further pursuit was impossible. After their invasion of Russia in 1941, the German armies outflanked these marshes by a southern thrust towards Kiev and a northern one through Minsk towards Moscow and Smolensk. When the Germans were forced back on the line of the Dnieper in 1943, they launched an offensive in the Kiev bulge, but this collapsed, and in Dec. a Russian counter-offensive broke the German line. In 1944 a Russian advance N. of the marshes resulted in the capture of the German bastion of Vitebsk on June 26, and Pinsk was taken on July 14.

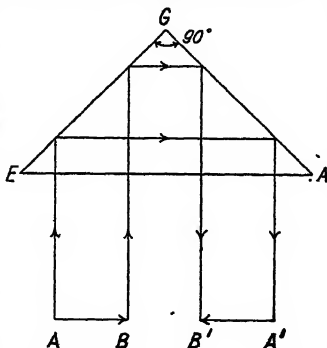
Priscillian (d. 385). Spanish heretic. A man of birth, fortune, eloquence, and learning, he appears to have taught an admixture of Gnostic and Manichaean doctrines. He exerted influence at the court of the emperor Gratian, and secured the support of two bishops, who made him bishop of Avila. The civil power being invoked, Priscillian and several of his followers were, by order of Maximus, put to death at Treves, the first victims of a criminal prosecution for heresy. The sect founded by Priscillian existed until about 560. The term Priscillianists is sometimes applied to the Montanists from an early prophetess of Montanism (*q.v.*) called Priscilla.

Prism (Gr. *prisma*, something sawn). Semi-regular solid. The two faces or bases are equal polygons, and the lateral faces parallelograms.



lateral faces perpendicular to the bases. If the bases are regular polygons, and the prism is also a right prism, it is called a regular prism. The prism used in optics is usually a triangular prism, i.e. its bases are triangles. In the figure above A is a source of light and A B a ray which is refracted at the faces E G and F G containing the refracting angle E G F of the prism. The light appears to the observer

D to be in the line D C H. A right-angle prism E G F (below) may be used to invert any image A B as shown, use being made of the fact that the rays of light incident on



the faces E G and G F are totally internally reflected. See Binocular; Crystallography; Dispersion; Lens; Optics; Periscope; Spectrum.

If a prisoner could not pay, he might linger on till death. Prisons were so unhealthy that it was computed that every year a quarter of the prisoners died of gaol fever, a virulent form of typhus so infectious that at the "black sessions" of the Old Bailey in 1750 nearly everyone in court was taken ill, and four out of the six judges and some 40 other persons died.

In the last half of the 17th century magistrates were permitted to send people to "bridewells" or "houses of correction." These places were under the control of the justices of quarter sessions. They seem to have started as workhouses, where vagrants could be made to labour for their keep. Later they were used for the punishment of minor offenders, a practice made legal in 1711, by which time the bridewells were almost indistinguishable from the gaols, and were often housed in the same building, though the theoretical distinction between them lasted till 1865.

When in 1776 the American colonies liberated themselves, the practice of transporting criminals to them, which had gone on since Elizabeth's reign, came to an end, and until transportation to Australia began in 1788, extra prisoners had to be housed. Old ships at Woolwich and elsewhere were converted to this purpose, and the convicts (some of them under 16) held in them were employed on public works. This system of "the hulks" lasted for eighty years.

The Beginnings of Reform

From time to time from the 13th century onwards, voices were raised protesting against the utter wretchedness and degradation of prisoners. But no serious attempts at change were made until, at the end of 1773, John Howard began his work as a prison reformer, travelling constantly in England and throughout Europe. In England several Acts of parliament embodied the reforms he advocated, but were not put into effect; and although the new prison at Millbank, finished in 1816, showed considerable advances, most of the gaols soon relapsed into "their former horrid state." When Elizabeth Fry began to visit women prisoners in Newgate in 1817 their ward was described as a "hell above ground." Through her labours and those of the Prison Discipline Society improvements were made and fresh Acts of parliament passed, too often still evaded; moreover, they did

PRISON AND PRISON REFORM

S. Margery Fry, Hon. Sec. Howard League for Penal Reform, 1919-26

This account of the prison system in the U.K., with some reference to the system in the U.S.A. and elsewhere, is supplemented by articles on the Borstal System; Prisoner of War; Punishment; Transportation, etc.; and on prison reformers, notably Fry, Elizabeth, and Howard, John

From very early times people in authority have maintained places of confinement, or prisons (from Lat. *prendere*, to seize). The early Babylonian name was houses of darkness; and we read in the Bible that Joseph's master, displeased with him, "put him into the prison, a place where the king's prisoners were bound."

Most famous among the prisons of antiquity were the great quarries of Syracuse; in the time of Cicero they served for the safe keeping of criminals from all over Sicily. But though people were confined in prison at the whim of arbitrary authority, while awaiting legal trial and punishment, or to enforce the payment of debts, the use of a prison as a punishment in itself is comparatively modern. Beccaria, writing in 1764, urged its more frequent use, in place of other more cruel punishments, but with the proviso that prisons must first be greatly improved.

In England, imprisonment does not seem to have been in general use as a punishment before the 17th century, though it was earlier recognized for enforcing the payment of fines. At that time the punishment for felonies was still death (with transportation as a

later alternative), though many felons, through various devices (such as benefit of clergy), escaped with lighter punishments. Misdemeanours were punished by fines, whipping, the pillory, and mutilation. In 1403 a statute was passed which provided that justices should commit prisoners only to the common gaol. Though all such gaols in theory belonged to the king, it was only in the county gaols that the sheriff, as the king's officer, had real control. The right to keep gaols was granted to many people or corporations, amongst them the archbishop of York, the dean and chapter of Westminster, and the dean of York, who got £4 a year from his gaoler. For it was the usual practice to farm out prisons to individuals. One man in the 18th century paid £5,000 for the control of one prison for his own and his son's life. The gaoler made his profit in various ways, often being at once tavern master and brothel keeper. He charged fees to the prisoners for entering the prison, for being put into irons, for bed and room, for food, for light or firing, for playing games or gambling or drinking, for having irons struck off, and for discharge.

not apply to the three great debtor prisons, nor to the small local gaols and bridewells; and they made no provision for inspection.

The English reformers of the late 18th and early 19th centuries, contrary to popular belief, were not responsible for solitary confinement and other psychological cruelties of the 19th century. As Bernard Shaw pointed out: "Howard is not responsible; he warned us that absolute silence is more than human nature can bear without the hazard of distraction and despair." Elizabeth Fry saw nothing but mischief in prison silence and prison solitude. Bentham also inveighed against the belief that "by vacancy of mind mental improvement can be assured."

The plea of these early reformers for separation at night-time is too often read as though it involved solitude by day.

Early American Reforms

The belief in solitude had its origin overseas. In N. America, after a first short attempt by William Penn to deal with offenders on less cruel lines than he had known in England, the evil features of English prisons had been duplicated in the colonies. But shortly after American Independence had been declared, a group of men, amongst them Benjamin Franklin, founded the Philadelphia Society for alleviating the miseries of public prisons. They actually built and for some years managed a most successful prison on the lines of individual treatment, forbidding the use of irons or the carrying of arms or even a cane by the keepers.

Twelve voluntary inspectors managed the place, and gave themselves to their task with great devotion, providing books, lectures, and remunerated work for the prisoners. One of the inspectors visited daily. A remarkable diminution of crime was noticed. But the place soon degenerated owing to less wise and disinterested management and overcrowding. Inspired by Howard's work in Europe, Pennsylvania met the latter difficulty by building two new prisons, with a separate cell for each inmate. But, influenced more by a horror of contamination than by Howard's humanity, they introduced solitary confinement, night and day, for any period up to life, with severe punishments to enforce obedience. New York followed suit with a prison founded upon a method of "solitude, silence, and darkness."

Many victims of this regime went mad, and as a result the mitigated system called, from its place of origin, the Auburn system was inaugurated; it consisted of segregation at night, with associated work by day in absolute silence, imposed with continual corporal punishment even for looking up from work. This same method was followed at the new prison at Sing Sing.

Not all the U.S. prisons adopted this severity, but the main trend of American penology was towards solitude, silence, and severity, and its influence upon British practice was direct and powerful. The 19th century in the U.K. saw an unedifying succession of attempts to make men virtuous by making them miserable, by solitary or by separate confinement (the latter system allowing intercourse with officers and instructors of the prison and the leaving of the cell for chapel and exercise), through the heart-breaking toil of treadmill and crank, and by boredom to the limits of sanity. Deterrence rather than reform was often frankly admitted to be the aim of the system, even an archbishop asserting "we cannot admit that the reformation of the convict is an essential part of the punishment."

Home Office in Control

By the Prison Act of 1877 all local prisons were brought under the control of the Home Office, and managed by a body of commissioners already responsible for convict prisons—a great advance in organization which brought the two sentences of imprisonment (up to two years) and penal servitude (from three years upwards), under the same administration. The Prison Act of 1898 abolished the treadmill and the crank, and gave the Home office greater freedom in the administration of prisons. The Prevention of Crime Act, 1908, created two new forms of sentence, preventive detention and Borstal treatment, making these also part of a unified structure. Preventive detention had little success: the procedure leading to it was cumbersome and the results as shown by the discharged prisoners were not encouraging.

The marked change in the general attitude to prisoners which the 20th century brought was shown in the Criminal Justice Act of 1948. Experiments, particularly in Sweden, had already shown the possibility and value of dealing with a large percentage of prisoners on terms of "minimum

security," allowing of a regime in which more training in responsibility was possible than under the old system of rigid control at all times. The Criminal Justice Act swept away the distinctions between hard labour and simple imprisonment, between imprisonment and penal servitude; introduced new regulations for preventive detention, and a new form of sentence, corrective training; and gave very wide powers to the commissioners in the matter of the classification of prisoners. These changes were in the direction of making prison, instead of simply a punishment, a training for the prisoner who showed capacity for abandoning a life of crime, and they made it necessary to group prisoners according to their capacity for education and industrial training rather than according to offence.

Special Types of Prison

Before the Act of 1948 was introduced Borstal institutions already specialised for different types of young offenders, and some prisons were organized to meet particular needs: e.g. at Maidstone and at Wakefield emphasis was laid upon industrial training; the prisons at Askham Grange for women and Leyhill for men were run on "open" lines. With the cooperation of local education authorities, educational facilities and libraries were steadily improved. More attention was paid to the causes of crime in individuals, psychiatric treatment being provided in suitable cases.

The imprisonment of young children was forbidden by the Children Act of 1908, though young persons aged 15 and over (magistrates' courts 17 and over) may be sent to prison if no other means of dealing with them can be found.

The prison commission for Scotland, set up by the Act of 1877, became in 1929 the Scottish Prisons dept. In 1939 this became a div. of the Home dept. It now has under its charge all the prisons of Scotland and six Borstals, two for girls and four for boys, of which two are experimental institutions of the "open" type, and two are in parts of ordinary prisons.

The prison systems of the world vary enormously, and it is not possible to describe them all here. The League of Nations drew up Rules for the Treatment of Prisoners which received the approval of a large number of national govts. These rules were intended to represent the minimum

rather than the maximum of good treatment, but few countries at the end of the Second Great War had reached even that minimum standard. The United Nations studied the treatment of prisoners through its human rights commission.

Bibliography. English Prisons under Local Government, S. and B. Webb, 1922; English Prisons Today, S. Hobhouse and A. F. Brockway, 1922; The Crime of Punishment, M. Wilson, 1931; The Lawbreaker, E. R. Calvert, 1933; The Modern English Prison, L. W. Fox, 1934; Crime and the Community, Leo Page, 1938; Annual Reports of the Commissioners of Prisons, H.M.S.O.; Publications of the Howard League for Penal Reform, Parliament Mans., London, S.W.1.

Prison Commission. Home office department which looks after prisons in England and Wales. It has a chairman and two paid commissioners, assisted by six directors and other officials. In Scotland similar duties are performed by the Prison Commission, 11, Rutland Square, Edinburgh.

Prisoner of War. Subject of a belligerent country detained for a period of war. In early times prisoners of war were regarded as the property of their captors, and as such were liable to slavery, or to ransom, if their rank and wealth permitted it; and it was not until the 13th century that the exchange of prisoners began.

During the 19th century the growth of humanitarian sentiment gradually brought recognition that a prisoner had certain rights, and the Hague Convention of 1907 included detailed regulations designed to ameliorate the condition of life in internment camps. The U.S.A. did not sign, and it was not until the morning of Nov. 11, 1918, that an agreement regarding prisoners was arrived at between the U.S.A. and Germany.

In 1929 delegates of 47 nations met at Geneva and, except Russia and Japan, ratified an agreement regarding prisoners of war. This stated that prisoners must be humanely treated and protected from violence, insult, and public curiosity, and reprisals were forbidden. Food was to be equal to that of troops of the detaining power at base camps, and sanitary and medical facilities provided. Prisoners were not to be individually confined unless they offended against specified regulations. Prisoners other than officers are liable to work for the retaining power, being paid according to rank and ability. The work must not be directly connected with

military operations. Officers are paid the same as those of corresponding rank in the forces of the detaining power. It is the duty of officer prisoners to make every endeavour to escape, provided they have not given parole, but they may be punished if captured. The convention further allowed for information about prisoners to be provided through information bureaux in the belligerent countries. In the First and Second Great Wars a central information bureau was at Geneva, where the International Red Cross maintained a detailed card index.

In time of war, a neutral power looks after the interests of prisoners; such protecting powers are entitled to visit prison camps and question the inmates. Certain non-combatant military personnel, such as padres, doctors, and medical orderlies, may claim repatriation. Provided the interested powers agree, prisoners may be exchanged in proportions mutually satisfactory. On capture, a prisoner is bound to give his true name, rank, and service number, but he is not to be forced to disclose other information. Prisoners of war may be held by the victor power after hostilities until the signing of the official peace treaty.

The Second Great War, in which forces were often by-passed in an advance, resulted in the capture of exceptionally large numbers of prisoners. Two of the major powers concerned, Russia and Japan, had not ratified the Geneva Convention of 1929, but Russia agreed to apply the Hague Convention of 1907, which did not provide for neutral observation of prison camps or for the exchange of prisoners' names. Japan agreed to abide by the terms of the 1929 convention, but without ratifying it. In general, Germany strictly observed the convention with British prisoners of war; but other captives were virtually employed as slave labour. The large numbers of French prisoners of war were used as hostages in negotiations with the Vichy government. Japan broke every convention and employed prisoners as unpaid coolie labour; but this was understandable, as the Japanese military code does not recognize any necessity for a combatant to surrender.

At the end of the Second Great War the victorious Allied powers held some 14,000,000 prisoners, of whom nearly 7,000,000 were German. Most of them had returned home by the end of 1948. During 1946 and 1947 several meetings to

consider revisions of the Geneva Convention of 1929 as it affected prisoners of war were held at Geneva under the auspices of the International Red Cross. They were chiefly concerned with strengthening the interests of prisoners (see Geneva Convention in N.V.). In 1945, the International Red Cross received the Nobel Peace Prize for its work on behalf of prisoners of war of all nations in the Second Great War. See Casualty; Geneva Convention; International Red Cross.

Prisoner of Zenda, THE. Romantic novel by Anthony Hope, published 1894. It introduced the word Ruritania to the language, this being the name the author gave to the small imaginary European state in whose perilous court intrigues his hero, a travelling English aristocrat, becomes so involved that for a time he impersonates their king. A sequel, *Rupert of Hentzau*, appeared in 1898. A stage version of the original book was produced at the St. James's Theatre, London, in 1896, in which George Alexander played the part of the English traveller, Rudolf Rassendyl, as well as that of the king of Ruritania. On the screen the same part has been played by Henry Ainley (silent) and Ronald Colman. A dramatic version of the story has also been broadcast as a serial play by the B.B.C. (1939).

Prisoner's Friend. At courts martial, a person, officially styled friend of accused, authorised to assist the accused in his defence. He may be a qualified legal adviser or any other person. If the friend is not a barrister, a solicitor, or an officer subject to military law, he can only advise the accused and suggest questions to be put by him to witnesses; but if he is a barrister, a solicitor, or an officer subject to military law, he has the rights and duties of counsel under the rules of military law.

Pristina or PRISHTINA. Tn. of Yugoslavia, in Kossovo-Metahija prov. On the E. of the Kossovo Plain, it is 60 m. N. of Usküb close to the rly. from Usküb to Mitrovitsa. In normal times it has a fair trade in grain and wine. It was captured by the Serbs from the Turks on Oct. 22, 1912. During the First Great War it was occupied by the Austro-Germans, Nov. 26, 1915, and reoccupied by the Allies in Oct., 1918. Pop. est. 10,000.

Privas. Town of France. The capital of the dept. of Ardèche, it stands on the N.E. slope of Mont Toulon between three valleys, 95

m. S.W. of Lyons. There are iron mines, distilleries, and silk factories, and a trade is carried on in truffles, butter, cheese, and game. The town grew up round a castle, built in the 12th century, and was the ancient capital of Boutières. It became a stronghold of the Huguenots, and in 1629 Louis XIII decided to reduce it. After a stubborn defence the place surrendered to him, the castle and other buildings being razed.

Private. The lowest rank in an army; a soldier who does not hold any commissioned or non-commissioned rank. In medieval armies the term was applied to men who served as personal attendants to knights; their principal duty was to act as a bodyguard to their master. They were paid by the knight and were not on the army pay list, as distinct from the ordinary serving soldiery, paid by the crown. In the 17th century, the term was applied to soldiers voluntarily joining a regiment, being paid by the commanding officer, to distinguish them from the impressed men whose pay was a charge on the crown. Ultimately the term was adopted for any soldier below non-commissioned rank. In 1946 the British army introduced two classes of private; one star and two star. A one star private is a soldier without any trade, a two star private a man who has an army trade. Most foreign armies have first and second-class privates. The private's equivalent rank in the navy is seaman and in the R.A.F. aircrewman.

Private Bill. In British parliamentary procedure, a bill promoted for private purposes. Private bills may be either local or personal. Local bills are usually obtained by corporations for public utilities. Personal bills may be passed to change the name of a person or to give a trust additional powers. A private member's bill is one introduced not by the govt. but by an M.P. See Bill; Parliament; Standing Order.

Private Company. Company which by its constitution restricts the transfer of its shares, limits its shareholders to fifty, apart from employees, and prohibits any invitation being made to the public in general to subscribe for its shares. Such companies receive certain privileges under the law governing limited companies and are often family concerns. In contrast, the public company issues its shares to the public, and is usually a larger enterprise.

Privateer. Armed vessel privately owned and furnished with letters of marque. These empowered it to attack the ships of any power with which its country was at war. Privateers are things of the past. See International Law; Letter of Marque.

Private Secretary. THE Farical comedy in four acts. Adapted by Charles Hawtrey from Von Moser's *Der Bibliothekar*, it was produced at the Prince's—now Prince of Wales's—Theatre, London, March 29, 1884, with Beerbohm Tree as the Rev. Robert Spalding, the chief comic character, whose cry is "I don't like London." It was afterwards transferred to the (old) Globe, where W. S. Penley took up the part of Spalding.

Privet (*Ligustrum vulgare*). Shrub of the family Oleaceae, native of Europe and N. Africa.



Privet. Leaves and berries of the European shrub

It has opposite, oblong-lance-shaped leaves and small, funnel-shaped white flowers in abundant clusters. The fruit is a small, round, purple-black berry, which yields oil and a rose-coloured dye. Privet makes a neat and fairly close-set hedge, suitable for gardens.

Privilege (Lat. *privilegium*). Word used in two related senses: (1) exemption of an individual or class from ordinary law; (2) peculiar right or advantage enjoyed by a person or body of persons in the community.

In English law both houses of parliament have certain privileges, some applying to each house as a whole and some to the members as individuals. The privileges of the commons are freedom from arrest, except for certain serious crimes; freedom of speech; freedom from jury service; right of access to the crown through the speaker; right to regulate their own proceedings; right to exclude strangers from debates; right to punish those who infringe their privileges. It is an infringement of the privileges

of the commons to libel the house as a whole, to libel any member in his capacity as member, or to attempt to influence a member by threats as to the way he should vote. Alleged infringements of privilege are referred to the committee of privileges. The house has power to punish infringements of its privileges by committing the offender to prison for the remainder of the session, by reprimand and admonition, and in the case of members by expulsion or suspension.

The privileges of the house of lords are similar. They have the additional privilege of being tried by the house lords and not by a jury in the ordinary courts on any charge of felony.

Questions of privilege raised in parliament take precedence of all other business, for hard-won privileges are jealously guarded.

Clergymen are privileged from arrest while going to service, holding service, and returning from service, and barristers while going to, performing, and coming back from their professional duties in court. By charter corporations of various kinds enjoy definite privileges, many of which are of long standing. See Libel; Parliament.

Privy. Term used in English and American law to denote a direct legal relation. Privy in blood indicates a blood relationship, e.g. heir and ancestor. Privy of estate indicates that the persons of whom it is predicated have a relationship with regard to the title to property. For example, there is privy of estate between a lessor and lessee and their assignees, between joint tenants; and the privy lasts so long as the estate lasts, so that an assignee of a lease ceases to have privy with the lessor if he assigns the lease again. Between a lessor and sub-lessee there is no privy. Privy of contract is the term used to describe the relation between parties who have entered into contractual relations with each other, or between the assignees of the contracting parties who, by law, are put in the place of the persons who originally contracted.

Privy (F. *privé*, private). Closet containing a receptacle for faecal matter. The early privy was a small building erected over an excavation, lined with brick or cement, and having seating accommodation. The contents were emptied at intervals of some months, so that a nuisance was set up by the effluvia. In districts where it is not practicable to

connect a closet to a private or public sewer, privies are still used, but the receptacle is much smaller, a strong galvanised bucket which can be removed and emptied. An earth closet is preferable. Pail-privies are recognized by by-laws of sanitary authorities; the method of construction is rigorously controlled, as also its distance from other premises and from a well or other supply of drinking water. The building must be paved with a hard and jointless impervious material; the walls, of brick or concrete, must be rendered with a similar material. See Water Closet.

Privy Council. The British sovereign's body of advisers with judicial powers. In the Middle Ages in England there was but one king's council. Under Henry III it was a *magnum concilium*; under Edward I purely royal. Under Edward II the barons again came to the front, and the king sought to counter their offensive by developing a council which was called *concilium continuum*, *secretum*, or *privatum*. Now the council might be held in or out of parliament, and there was little difference between the great council in parliament and the body which, in Henry VIII's reign, came to be called the house of lords. Hence the great council in parliament merged in the house of lords, while the great council out of parliament was summoned less often, until it flickered out of existence on the eve of the Great Rebellion.

The small royal council continued to develop, and by Richard II's reign was known as the privy council. It governed during the minority of Henry VI, but suffered from the subsequent decline in royal authority, and the Wars of the Roses broke out because the privy council foundered between the factions of York and Lancaster. Henry VII at first governed personally with such advice as he chose to take from councillors who were not apparently organized in a body, but before the end of his reign there was a president of the council, and the council itself was completely reorganized under Henry VIII.

From 1540 it possessed a regular staff of clerks and other officials; its records became regular and abundant; and from it most of the existing administrative system has developed. It had two main functions during the 16th and 17th centuries. First, it sat "at the council board" to act as a council of state, discussing and advising the crown on all matters of policy

and taking administrative action; and secondly, reinforced by judicial and other assessors, it sat on Wednesdays and Fridays in a room known as the Star Chamber (*q.v.*), which was better adapted for the functions of a court of law. Besides these functions it controlled similar subordinate bodies, namely, the councils of the North, of Wales and its Marches, and the Irish privy council.

The privy council consisted of a selection of the "ordinary" councillors of the crown who survive today only in the K.C.s. Under Henry VIII twenty was about the average number, in the reign of Mary there were over fifty. Elizabeth reduced the number to twenty or even fewer, and they remained at this figure until the Restoration. Then they increased again, and "inner rings" began to appear, like the Cabal.

This tendency resulted in the modern cabinet, and the privy council was gradually reduced to formal business. It retained, however, one function of importance in the 18th century, and continued to debate and to determine the fate of Irish bills, which, by Poynings' Law, had to receive its sanction before they could be introduced into the Irish parliament. This function disappeared with the establishment of Grattan's parliament in 1782.

Privy Council Committees

Of these the most important is the Judicial Committee (*q.v.*) of the privy council. The Long Parliament abolished the court of Star Chamber in 1641, but the civil jurisdiction which the privy council had exercised "at the council board" survived and expanded until the judicial committee became the most important law court in the empire. It was long the supreme court of appeal for all civil cases arising in the British Commonwealth outside the U.K., and within it the supreme court for ecclesiastical appeals, although ecclesiastical prejudice hampers recourse to it. Its members sit at 9, Downing St., without any trappings, state, or dignity, except that given by the importance of their business. Technically they are engaged in giving advice to the crown, and that advice has more effect than the decisions of any law court in the world. No other body has done so much to give the Commonwealth its legal and constitutional unity.

Apart from its committees the privy council has ceased to discharge any but formal functions, and membership has become an

honorary distinction, conveying the style "right honourable," and frequently conferred upon men without any qualification to perform the duties once assigned to the privy council. All cabinet ministers belong to it. So do ministers of the crown in Canada, Australia, S. Africa, and elsewhere.

In Canada a privy council has been formed for the dominion on the English model. Scotland had a privy council until the union of 1707, when it was merged in the English one. Privy councils or their equivalent, councils of state, exist in several foreign countries. Consult Constitutional History of England, W. Stubbs, 1884-1903; The Privy Council, A. V. Dicey, 1887; The King's Council in England during the Middle Ages, J. F. Baldwin, 1913.

Privy Purse. Money granted to the king and queen from the civil list for their own personal expenditure. Under the king's direction the expenditure of this money is managed by the privy purse office, at the head of which is the keeper. In 1910 the amount was fixed at £110,000 a year. See Civil List.

Privy Seal. In the U.K., a seal used by the sovereign. It is second in importance to the great seal, but is now rarely used. This seal was used on warrants requesting the lord chancellor to affix the great seal, and for documents which were not of sufficient importance to require the great seal. The necessity for the former was abolished in 1884. The keeper of this seal is known as the lord privy seal (*q.v.*).

Prix de Rome. A French academic award, founded by Louis XIV in 1666. Its purpose was to educate young painters and sculptors of promise at the cost of the state, by study of the antique in Rome. In 1720 architects were allowed to compete for the prize, and after 1803 musicians, medallists, and engravers. At this date the school was transferred to the Villa Medici, its present site. Winners of the prize have four years' training during which they are exempt from military service. The Académie des Beaux-Arts, a section of the French Institute, is in charge of the school at Rome; the director is usually a French painter.

For details of a British equivalent to the Prix de Rome, see Rome Scholarships.

Prize Bounty. Monetary grant made out of public funds and divided among the officers and crews of ships of war who are "actually present" at the taking

or destroying of an armed enemy ship. This payment was first introduced in 1649. The amount depended on the number of guns in the enemy ship, being £20 for each gun on an admiral's ship and lesser sums for each gun on other ships. By the first Naval Prize Act (1708) the total sum to be divided was £5 for each man living on the enemy ship at the beginning of the engagement, and was then occasionally called head money.

The provisions were substantially reproduced in the Naval Prize Act, 1864. In 1918 the right was extended to officers and men of aircraft operating under the directions of the Admiralty. No right to prize bounty can arise in any war unless the crown makes a proclamation to that effect. Such a proclamation was made in the First Great War and payments were made in respect of the principal naval engagements, e.g. the battle of Jutland, in respect of which the total bounty amounted to £22,685, there being 4,537 persons on the eleven enemy ships destroyed. This was divided among the whole fleet. No proclamation was made during the Second Great War, and it was announced in the house of commons in 1945 that bounty must be considered obsolete, since the credit for the taking or destruction of an enemy ship must now be shared by many not actually present at the engagement.

Prize Court. Court of law held in time of war. On the outbreak of a war involving hostilities at sea every country sets up a tribunal called a prize court, the business of which it is to examine the validity of capture of ships and goods made at sea by the navy of its country. Such a court is really an international tribunal, and its decisions ought to be governed by international law, so that, theoretically, any question at issue would be decided the same way wherever it was tried. Each country, however, makes its own rules of procedure, but in England, at any rate, no rule is allowed to be made which will hamper the court in deciding cases according to international law, or which will result in any litigant being deprived of his rights under that code. The British courts of prize are constituted by commission under the great seal. In many parts of the British Commonwealth there is an appeal to the judicial committee of the privy council. See Blockade; International Law.

Prize Fight. Term used for a pugilistic contest, fought with bare fists, for a money prize. This is now forbidden by law in the U.K., the U.S.A., and other civilized countries, and its place has been taken by contests in which boxing-gloves are worn. In England the age of prize fights was from about 1750 to 1850. The last great prize fight was the one between Sayers and Heenan, April 17, 1860. See Boxing.

Prize Money. Net proceeds of the sale of enemy property and contraband lawfully captured at sea. Before 1914 the money was divided among those actually engaged in the capture, and large fortunes were often made. Thus Anson in his voyage round the world took prize of over £1,000,000 of which he received about £125,000. In 1762 the Spanish treasure ship *Hermione*, to the value of over £500,000, was taken by *Active* (frigate) and *Favourite* (sloop). The admiral received £64,963, every lieutenant £13,000, and every seaman £485.

In the First Great War it was held that conditions made it unfair to limit the payment to those actually engaged in the capture, and accordingly all actively serving in the Navy were entitled to share. The total fund amounted to about £14,000,000, and the amount of the shares varied from £3,000 for an admiral to £25 for a seaman. After the Second Great War a fund of £4,000,000 was divided among all men and women who had served 180 days at sea between 1939 and 1945, an admiral of the fleet receiving 40 guineas and an ordinary seaman four guineas. It was announced in 1945 that this would be the last distribution of prize money. Prize money should be distinguished from the grant known as Prize Bounty (*q.v.*).

Prizren. Town of Yugoslavia, in Kossovo-Metahija province. On the E. edge of the Albanian Mts., the centre of a department of the same name, it is about 60 m. N.W. of Üsküb, and at one time was famous for its manufacture of weapons. Before the First Great War it had a brisk trade, and a glass industry. It is the seat of a R.C. archbishop and of a Greek metropolitan. In the first Balkan war it was occupied by the Serbs in Oct., 1912. During the First Great War it was the scene of heavy fighting before the major part of the Serbian army retreated through it into the Albanian Mts., Nov.-Dec., 1915. It was occupied by the Bulgars, Nov. 28, and

retaken by the French about Oct. 12, 1918. Pop., 18,952.

Proa (Malay *prahu*). Malaysian sailing boat. Both ends being built in bow form, it can sail equally well in both directions, and it is fitted with an outrigger contrivance projecting a boat-like float to prevent capsizing. Rigged with large lateen-like sails, proas attain remarkably high speed, and are used in many parts of Polynesia. See Boat; Catamaran.

Probabilism. Doctrine or theory according to which no action is sinful when there exists the slightest probability that it may be lawful, or when it has the approval of a reputable teacher. The origin of the doctrine has been traced to the Greek Sophists and Jewish Talmudists, but it was first made systematic by the Jesuits. Condemned by the Sorbonne, 1620, it was disapproved by Alexander VII, 1665, and Innocent XI, 1679. The Jesuit general Gonzales attacked it in his *Fundamenta Theologiae Moralis*, 1691, but it later found a champion in Alfonso Maria de Liguori (1696-1787). The term is often used in connexion with cases arising in confession. See Casuistry.

Probability. The chance of an event; the likelihood of a statement being true or of a stated event occurring; the strength of the belief in the correspondence between statement and fact. Where probability is high, the scope for doubt is small; probability therefore indicates the basis for rational belief. A jury has the task of assessing probability in the conflicting evidence of witnesses; a trader when buying goods has to consider the probability of being able to sell them profitably. Everyday judgements are estimates of probability, which has been called "the very guide of life."

Often there cannot be precise measurement; e.g. with the probability that a particular person on a certain occasion is telling the truth, or that it will rain tomorrow. Sometimes experience provides a quantitative basis for assessing probability; a life assurance premium is based on the probability that the individual's span of life will conform to the pattern revealed by statistics of deaths; records of illness indicate the probability that a certain percentage of the population will contract diphtheria next month, and that a percentage of those under five years old will die from the disease. Much statistical science is con-

cerned with collecting and interpreting material for estimating probabilities.

Sometimes the probability of an event can be stated definitely because of the nature of the event; thus, the probability that a tossed coin will fall with the head uppermost is $1/2$; that an ace will be cut from a pack of cards, is $4/52$ or $1/13$, which probability may be expressed by saying that the chance is 1 in 13 or the odds are 12 to 1 against. The mathematical theory of probability was developed principally through the study of such precise chances. It has considerable importance in scientific research. *Consult* History of the Theory of Probabilities, I. Todhunter, 1865.

Probate. Official proof of the legality of a will. In English law, derived in this respect from ecclesiastical law, it is necessary for the will of a deceased person to be proved in the probate division of the high court of justice before it can be acted upon. The judge or other officer of the court must be satisfied by proof that the document in question is really the will of the deceased. With a will which appears to have been duly executed, and to which there is no opposition, the officials of the probate registry grant probate without trouble; but when there appears to be some irregularity in the execution of the will, or there is opposition from anyone interested, the matter comes before a judge in court. Probate can be granted by any officer of inland revenue in cases where the personal estate does not exceed £500.

When the will is admitted to probate, the original will is filed in Somerset House, London, and is a public document which can be inspected by anybody on payment of a small fee. The will is photographed and a photographic copy may be obtained and attached to the grant. The grant is accepted everywhere as evidence of the will. At the personal applications department at Somerset House persons may get help in obtaining probate without the assistance of a solicitor. In the majority of county towns there is a district registry at which probate may be obtained. *See* Administrator; Estate Duty; Executor; Will.

Probation. System in criminal courts for releasing delinquents without punishment under supervision of a probation officer. At first, in the U.K., the movement was not wholly successful. The Probation of First Offenders Act,

1887, was restricted in scope, and provided no means of making probation really effective. Such means were first sought in the American courts, where probation officers were appointed to supervise offenders during their time of testing. So fruitful did the experiment prove that its methods were applied in the U.K. by the Probation of Offenders Act, 1907.

The Criminal Justice Act, 1948, made several alterations in the system. Under this Act a court, if it is of opinion that having regard to the circumstances including the nature of the offence and the character of the offender it is expedient to do so, may, instead of sentencing a convicted person, make a probation order placing him under the supervision of a probation officer for a minimum of one year and maximum of three years. The order may also require the offender to comply with certain requirements for securing his good conduct, e.g. as to his residence. He may be required to reside in a probation home or an institution. If the offender fails to fulfil these requirements he may be fined or sentenced for his original offence.

In dealing with offenders who have been led into crime by sudden temptation, weakness of character, or adverse home conditions, the surveillance of a kind but firm officer proves invaluable. *See* Binding Over; Borstal System; Criminology; Reformatory Schools.

Probationer (Lat. *probatio*, test). Term applied to one undergoing trial for membership of a church or other religious community; for election or call to a pastorate; or for admittance to a profession, such as nursing. In Scotland, a divinity student admitted by a presbytery to trial as a preacher before ordination is called a probationer. *See* Presbyterianism.

Problem. In geometry, a proposition in which some operation or construction is required, e.g. to construct a circle within a given triangle. The term is used in contradistinction to porism (q.v.) and theorem (q.v.).

Proboscis Monkey (*Nasalis larvatus*). Species of monkey, found only in Borneo. It is distinguished by its long and bulbous

nose, which in the adult male hangs down and conceals most of the mouth. In the female it is smaller,



Proboscis Monkey of Borneo

while in young specimens it is turned upwards. The monkey is about 80 ins. long in body, with a tail of about 26 ins. The hair is chestnut on the head and back, and yellow elsewhere. The face is naked, surrounded with a fringe of outstanding hair. These monkeys are usually found in large companies in the woods, but little is known of their food or habits.

Probus. MARCUS AURELIUS. Roman emperor (A.D. 276-282). A native of Pannonia, he entered the military service of Rome, and became Aurelian's most distinguished general. On the death of the emperor Tacitus he was proclaimed emperor by the armies of the east, where he was in chief command. He proved an excellent ruler and an able general, defeating the Germans on the Rhine, and restoring order in Egypt and Gaul. He was preparing an expedition against Persia when he was murdered at Sirmium by his own soldiers, who resented the severity of his discipline.

Procedure (Lat. *procedere*, to go forward). Legal term for the manner in which suits, actions, and prosecutions are conducted in courts of law. Procedure is regulated in the high court and court of appeal by the Supreme Court of Judicature Act, 1925, and in county courts by the County Courts Act, 1934. There are also rules of court made under these Acts. *See* Parliament.

Process. Term in English law denoting the various steps taken in legal proceedings, such as the issue of a writ of summons, the issue of a writ of execution, and the like. When legal proceedings are taken which are found to be, on the face of them, not taken for the purpose of establishing a legal claim, but merely to vex and annoy the defendant, or to compel him to pay money or damages when obviously none are claimable, the court will summarily dismiss such proceedings, on the ground that they constitute an abuse of process of the court.

Process Engraving. General term embodying all processes of photo-mechanical reproduction,

i.e. making of printing surfaces, blocks, or mechanically engraved plates by photographic agency. It supplanted the wood block engraver, in the case of letterpress relief printing; by its means photogravure printing has become possible as produced today.

Excluding mammoth posters, the aid of process engraving is evoked in some manner or other for all modern illustrations and reproductions; it is the initial stage whereby it is possible to duplicate a subject or a photograph in hundreds of thousands. Every single illustration, map, and colour plate in this Encyclopedia has been duplicated from the original by process engraving in a fraction of the time and at a tithe of the cost of the wood engraver or the lithographic draughtsman.

Photo-Engraving

The processes of Colour Printing, Half-tone, Lithography, and Photogravure are described under their separate headings. Photo-engraving is the term used for the making of printing blocks from originals in line, e.g. pen and ink drawings, by photographic methods. The process consists essentially in forming on a zinc plate an image of the design, consisting of material which is an obstacle or "resist" to the action of an etching fluid. The parts of the metal representing the lines of the drawing are thus left standing in relief on the etched metal plate. The latter, when mounted on a wood block, is known as a line block or zinco, and is suitable for printing with type in a typographic press.

The method of preparing such blocks consists in: (1) making a photographic negative of the original to the required scale in a camera; (2) printing from the negative on to sensitised zinc; (3) converting the impression on the zinc into a resist capable of withstanding the acid used in (4) etching the zinc plate. The negative is made either by the wet collodion process or from dry-plates. It requires to be one in which the lines of the original are represented by clear glass and the ground by dense deposit. For printing from it on to zinc a solution of albumen (white of egg) and bichromate of ammonium is poured on the zinc plate, which is whirled to leave a thin sensitive coating and quickly dried over a gas-ring. The sensitised plate and the negative are pressed film to film in a strongly made printing-frame and exposed, usually to arc

light. The exposure renders the albumen forming the lines insoluble in water and also retentive of greasy ink.

The plate is then inked all over very thinly with lithographic printing ink, which is thus fixed on the lines; that on the ground is cleared off by immersing the plate in water and rubbing it with cotton-wool. The thinly inked lines remaining on the plate do not suffice to protect the metal beneath them from the etching liquid, but require to be reinforced before etching is begun, and also by successive operations as etching is done, in order to prevent the etching liquid from attacking the sides of the lines. Unless means are taken to prevent this sideways etching action—or undercut, as it is called—the lines will be broken and ragged.

Procession (Lat. *processus*, proceeding). Term used for a march or progress of a ceremonial kind, e.g. in the United Kingdom the procession of the king and his train to open parliament. It is used for the march of any organized body, but usually suggests an occasion of rejoicing. Under the Public Order Act, 1936, a chief officer of police may impose restrictions on processions—e.g. prescribe a special route when he thinks serious public disorder may be caused, or apply to the local council for an order prohibiting public processions in an area for three months. In London the commissioner of police may likewise prohibit processions with the consent of the Home secretary.

Processions, which were very elaborate among the Greeks and Romans, have always played a great part in religious ceremonial. They were introduced into the Christian Church at an early date, and are still generally used in the R.C. and Greek Churches. The R.C. Church lays down rules for processions which are held on feast days and other occasions. They frequently take the form of an ordered march through the town or village, the cross and sometimes the host being carried.

The reformed churches make far less use of this form of ceremonial, which was to a great extent abolished at the Reformation. Processions exist, however, in the Lutheran Church, especially funeral processions. In the Church of England, too, the funeral procession has always been recognized. The Oxford Movement led to the revival of other processions, and today in most episcopal churches the clergy

and choir enter and leave the church in procession, sometimes carrying the cross, in high churches with a more elaborate ritual. The hymn sung on these occasions is called the processional hymn.

In theology, the procession of the Holy Ghost is the emanation of the Holy Spirit from God. In the U.S.A. processioning is the term used for a periodical survey of boundaries, the official charged therewith being the processioner.

Procida (anc. *Prochyta*). Small island at the N.W. end of the Bay of Naples. It lies between Cape Miseno and Ischia, 12 m. S.W. of Naples. Of volcanic origin, its outline is very irregular; its length is about 2 m. The vine is cultivated and fruit is grown; coral is also produced. The neighbouring waters are prolific in tunny and sardines. The town of Procida, on the E. coast, has a castle and a royal palace. Procida was occupied by the British during the Napoleonic wars; and was occupied by Allied forces with Italian cooperation Sept. 15, 1943, during the Second Great War. It is said to have received its ancient name from having been formed by eruption from Vesuvius (Gr. *prochylos*, poured forth). Pop. est. 14,500.

Proclamation (Lat. *pro*, before; *clamare*, to cry aloud). Public announcement by royal authority of anything which the sovereign thinks proper to notify to the people. By extension the word is used of that which is so advertised, a public ordinance.

British proclamations emanate from the king in council, are issued under the great seal, and may be read aloud in the capital cities by the heralds, preceded by a fanfare of trumpets, and by other specially appointed officers elsewhere. It is sufficient, however, if they are published in the London, Edinburgh, or Belfast Gazette. They are always issued on the demise of the crown and the accession of a new sovereign, and on declaration of war. In times of war and other emergency they contain the instructions of the executive government with regard to the duties and liabilities of the people.

In normal times proclamations are concerned with the dissolution or prorogation of parliament, with the calling and adjourning or discharge of certain courts of law, and the like. Proclamations are binding only when issued to enforce the execution of existing law. Attempts made by Henry VIII to give them the effect of statute law, and thus to set the will of the

sovereign above the authority of the legislature, were defeated by parliament in the reign of Edward VI, and proclamations are thus the utterance of the legally constituted executive authority.

Proclus (A.D. 410-485). Neo-Platonist philosopher. Born at Constantinople, of Lycian descent, he studied at Athens, where he succeeded Syrianus as head of the Neo-Platonist school. A violent opponent of Christianity, he is chiefly important as having rigidly systematised the doctrines of his predecessors. He was in some ways a follower of Plotinus, although more of a mystic; but some of his views in regard to the divine unities and the intelligible are new. Besides commentaries on certain dialogues of Plato, he wrote mathematical and astronomical works. It is uncertain whether he was the author of a Grammatical Chrestomathy, the only source of our knowledge of the so-called epic cycle, extracts of which are preserved in the Bibliotheca of Photius. See Homer; Neo-Platonism; Plotinus; Plotinus.

Proconsul. Magistrate of ancient Rome invested with the power of a consul, and charged with the command of an army or the administration of a province. In the later republican period the wide powers or *imperium* granted to proconsuls were often shamefully abused. See Consul; Rome.

Procopius. East Roman emperor, A.D. 365-366. Born in Cilicia, he was a kinsman of Julian the Apostate, who made him joint commander of the army in Mesopotamia, and is said to have intended him to be his successor. On the accession of Valens (364), Procopius, finding his life in danger, fled to the Bosphorus, crossed over to Constantinople, and, favoured by popular discontent, was proclaimed emperor. Valens at first thought of abdicating; but after two severe defeats in Phrygia, Procopius, abandoned by his army, was captured and beheaded.

Procopius (fl. A.D. 560). Byzantine historian. Born at Caesarea in Palestine, and trained as a lawyer, he acted as secretary to Belisarius in several of his campaigns, and seems to have found favour with the emperor Justinian, who appointed him prefect of Constantinople in 562. He wrote histories of the Persian, Vandal, and Gothic wars, and a book on the public buildings erected by Justinian, but his most interesting work is his *Secret History*, a sort of *chronique scandaleuse* of the

court of Constantinople from 549 to 562, containing an attack on the Empress Theodora.

Procrustes (Gr., the stretcher). In Greek legend, the nickname of Polypemon, a robber of Attica, killed by Theseus. He boasted that he had a bed which fitted everyone, and made good his boast by stretching the limbs of victims who were too short, and cutting those of persons who were too long for the bed. Procrustes and his methods have become a proverbial expression for attempts to make everyone conform to one standard.

Procter, ADELAIDE ANN (1825-64). British poet. She was born in London, Oct. 30, 1825, a daughter



Adelaide Procter,
British poet

of Barry Cornwall (q.v.). Her poems, collected as *Legends and Lyrics*, 1858-60, and issued with an introduction by Dickens, include *The Angel's Story* and

The Legend of Provence, and such well-known lyrics as *The Lost Chord*. The hymn beginning *My God, I thank Thee*, is hers. She died of consumption, Feb. 2, 1864.

Procter, BRYAN WALLER. British poet, better known under his pen-name of Barry Cornwall (q.v.).

Procter, DOB. Contemporary British painter. After education in Paris, she studied at Newlyn, Cornwall, with which school she became associated. Many of her best-known compositions were nude studies, characterised by strong, solid draughtsmanship and decorative colour. She exhibited regularly at the R.A., her picture *Morning* (bought for the nation) achieving outstanding success in 1927. Elected A.R.A. in 1934, she became R.A. in 1942. She married in 1912 the painter Ernest Procter (d. 1935).

Proctor. One who manages the affairs of another. It is a contracted form of procurator. The king's proctor is an official entitled to intervene in a divorce or nullity suit where collusion or fraud is suspected. At Oxford and Cambridge the proctors are two university officials whose duties include that of maintaining discipline. They hold office for only one year. Sworn special constables who accompany them on their nightly rounds are known as "bulldogs." The representative of certain ecclesiastical bodies in convocation (q.v.) is called a proctor.

Proctor, RICHARD ANTHONY (1837-88). British astronomer. Born at Chelsea, March 23, 1837, he was educated at King's College, London, and S. John's College, Cambridge. His book, *Saturn and his System*, 1865, established Proctor as a popular scientific writer. He followed it with *Half-Hours with the Telescope*, 1868; *Other Worlds than Ours*, 1870; *The Orbs Around Us*, 1872; *The Poetry of Astronomy*, 1880. An able lecturer, he several times toured America, where he settled in 1884. The founder of the scientific monthly, *Knowledge*, Proctor died in New York, Sept. 12, 1888.

Procuration. Term for the providing of women for the purpose of illicit intercourse. In England, the Criminal Law Amendment Act of 1885 was directed mainly against the trading in women and girls disclosed by the investigations of W. T. Stead (q.v.). This statute imposes heavy penalties for procuring any girl under 21, who is not of known immoral character, to have illicit relations with any person, or procuring any woman of any age to become a prostitute, or to become an inmate of a house of ill-fame. It deals also with the offence of administering drugs, or using threats or false representations for the purpose of procuration. Where there is reason to suspect that a woman is detained in a disorderly house, magistrates are empowered to grant a search warrant. The Act of 1885 was modified by the Criminal Law Amendment Act, 1912. See Prostitution; White Slave Traffic.

Procurator (Lat. *procurare*, to take charge of). An authorised agent, especially one who conducts legal business for another, and is his accredited representative. In Rome under the empire, the title was held by governors of provinces, and also by the officer, corresponding to the modern collector, who had the management of the imperial revenues in a province. Procurator is the technical term for an attorney conducting an action by law, and in Scotland is the usual designation of the legal representative of a litigant in the inferior courts. The faculty of procurators in Glasgow was incorporated by charter in 1796, supplemented by a charter in 1897. It fixes standards for the professional fees of procurators and also undertakes the auditing of their accounts.

Procurator-fiscal. In Scottish law, title of the public prosecutor in the sheriff courts. H

is the sheriff's chief executive officer for his particular district, makes investigation of criminal charges, performs a coroner's duties by inquiring into causes of suspicious deaths, prosecutes cases indicted before the supreme court of judiciary, and is responsible to the sheriff and the lord advocate. He carries out also those duties which in England come within the scope of the grand jury. No action for wrongful arrest lies against him unless malice can be proved. Generally an enrolled law agent, his appointment is made by the lord advocate.

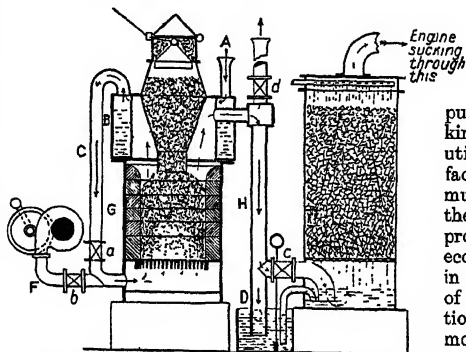
Procyon OR THE LESSER DOG STAR. One of the bright stars situated in the constellation of *Canis minor*. The star is remarkable for being one of the nearest stars to the earth, having a parallax of $0.29''$, and for its proper motion. It is approaching the sun at the rate of nearly 150 m. a minute. In 1896 it was discovered to be a double star.

Prodicus (c. 480-400 B.C.). Greek sophist. A native of Iulis in the island of Ceos, he early came to Athens, where his rhetorical gifts gained him the friendship of all the distinguished men of his time. One of his speeches contains the well-known apologue of the Choice of Hercules, of which an abstract is preserved in the *Memorabilia* of Xenophon. Hercules is represented at the parting of the ways, where he had to choose between Virtue and Vice, who plead their cause in the form of two women.

Producer-Gas. Fuel gas made in a furnace by passing air and steam through an incandescent mass of coke, anthracite, or other solid fuel. It consists mainly of carbon monoxide (up to about 40 p.c.) and nitrogen, and is described under the heading Gas: for Light, Heat, and Power. A plant for making the gas was devised by J. E. Dowson in 1878, and there have been many later developments; one of the most familiar is the portable producer trailed behind petrol-engined vehicles as a war-time source of power when petrol and such liquid fuels were scarce. Similar plant was used on small motor-vessels. The diagram shows the principal features of a suction gas producer, in which the suction caused through the engine pistons is used to induce a draught through the glowing fuel bed and so also to feed the gaseous fuel to the engine.

G is the generator with a feeder at the top, and a water-sealed ash-

pit at the bottom. Round the top runs a closed annular cast-iron trough which acts as boiler. The boiler communicates with the ash-



Producer-Gas. Sectional diagram of a suction gas producer plant. See text

pit by pipe C, which has a branch, F, running to a hand-driven ventilating fan. Pipe H connects the furnace with the dust-catcher, D. To start the apparatus, a fire is lighted in G and blown up by the fan, cocks *a* and *c* having been closed, and cocks *b* and *d* opened. In about ten minutes good gas is being produced, so cock *d* is shut and *c* is opened. The gas now passes through the system to an auxiliary vent near the engine, clearing out any stale gases. Blowing is continued for a short time after the engine has been started up, and *a* can then be opened and *b* shut. Air drawn in at A by the suction of the engine passes over the surface of the water in B, and absorbs moisture before traversing C to the ash-pit. The gas formed in the producer is sucked into the dust-catcher, where the heavier dust is deposited in a water-sealed pit. The finer dust is removed in the scrubber while passing up through coke, kept wet by water sprayed on it from the top. The gas then goes to the engine.

Water-Gas (*g.v.*) is made in somewhat similar plant. After the fuel in the producer has been made incandescent and raised to a suitable temperature by blowing air, the air supply is cut off and steam is blown through until the temperature falls; the cycle begins again, with air blowing, and so on.

Production (Lat. *producere*, to bring forth). Term used in industry to denote the making of goods: output: working processes; and in economics, in a wider sense, for the creation of wealth. In the economist's view this can be done by increasing the

utility of things through any of the following ways. (a) changing their form or appearance (manufacture): (b) altering their position in time (ware-

housing), or in place (trade): (c) raising their desirability through publicity of various kinds, and hence their utility. Since manufacture has become a much smaller part of the total production process than formerly, economists are justified in extending the sense of the word production; yet it is still most commonly used in regard to manufacture. Here should be distinguished individual

production, as with a suit of clothes made to measure; batch production, as with a ready-made suit; and mass production, as with an ordinary button, of which hundreds of thousands all identical are produced by one piece of machinery. This last is possible only where mass demand is known or can be anticipated. It generally involves automatic machinery, and frequently automatic conveyance of the material from process to process. Production engineering is concerned with analysing processes in order to select and arrange appropriate machines, tools, materials, and labour. Production control has the task of putting production engineering plans into operation and supervising the work. To the economist, the agents of production are land, capital, labour, and that specialised form of labour, organization, which co-ordinates the other three. (See Capital. Economics: Labour: Wealth.)

CENSUS OF PRODUCTION. This is a comprehensive inquiry into the composition, value, and volume of the output and the expenditure of the industries of a country. It provides government departments with necessary information, while the publication of the results gives information on economic trends to industrialists, economists, etc. The Census of Production Act, 1906, empowered the board of trade to require from industry statistics of manufacturing production. Except for interruptions caused by the First Great War, a census was taken every five years until 1935.

Experience during another war convinced government depart-

ments and many industrialists and business men that fuller information was needed than was available from quinquennial censuses. The Statistics of Trade Act, 1947, was therefore passed, authorising a census of production every year, and one of distribution and other services in any year prescribed by order. Each annual census is based on the activity of the preceding year. It may require information on the nature of an undertaking; employees and their work, remuneration, and hours; output, sales, deliveries, and services provided; articles bought or used; orders, stocks, work in progress; outgoings and costs; capital expenditure; receipts and book debts; electric and other power; and equipment and premises.

The first full census of production for 1948, taken in 1949, covered 160 different industries, grouped as follows: textiles, leather, fur, and clothing; metal; engineering and electrical; vehicle; food, drink, and tobacco; chemical and allied; wood and paper; mining; building materials and clay; building and civil engineering; public utilities; and other trades.

Production, MINISTRY OF. British govt. department set up in Feb., 1942. It replaced the production executive established in 1941 and its function was to develop British resources for maximum prosecution of the Second Great War. It allocated available resources of productive capacity and raw materials, and settled priorities where necessary. The ministry was merged with the board of trade in Oct., 1945.

Proetus. In Greek legend, the twin brother of Acrisius (*q.v.*). After a struggle he secured part of his kingdom of Argolis. His three daughters were driven mad by Dionysus or Hera. Perseus, to avenge Acrisius, turned Proetus into stone by showing the Gorgon's head. See Bellerophon; Perseus. *Prom. Preetus.*

Professionalism. Term applied to the system under which exponents of games employ their skill as a means of livelihood. It is thus sharply opposed to that displayed by the true amateur, who plays for sheer love of the game or sport without thought of material recompense. Professionalism is no new phenomenon. The Roman gladiator risked his life in the arena as a professional fighter, to whom success brought money as well as reputation; and the Greek culture of the body did not wholly exclude the element of professional-

ism. Indeed, there have been few civilizations or countries in which prowess at arms or in some form of sport could not claim substantial reward.

In modern times the term professionalism has acquired a fairly definite meaning, though in some sports the distinction between professional and amateur may seem to be rather finely drawn. The latter half of the 18th century in England marked the growth of rivalry and popular interest in sport and games, which has since developed to an amazing and almost disconcerting degree. Professional pugilists fought with bare knuckles in contests of endurance under the critical gaze of sportsmen who were their pupils in the noble art, and the loser did not, as in later years, receive a handsome *douceur* after recovering from the knock-out blow.

Cricket was then on the road to becoming the national game, but, as in football, the amateurs showed the way. Rugby football is, except in the North of England, confined to amateurs; while in first-class Association football amateurs and professionals rarely meet. In cricket, amateurs hold their own in a fixture like *Gentlemen v. Players*, but not numerically, for all county teams normally contain a majority of professionals. The universities, fed by the public schools, are the homes of amateur sport; their boat race still affords an instance of the amateur spirit at its best. As to golf and lawn tennis, the champion amateurs devote as much attention to the

word came into use in the universities of the Middle Ages, and is now the general term for those who fill the chief positions therein. Nearly all professorships are endowed, and the office is often spoken of as the chair. At Oxford and Cambridge many professorships are held in conjunction with college fellowships. Most professors are appointed by the university authorities, but the regius professors at the older universities are chosen by the crown. About 1600 the first professorship was endowed at Oxford, and later Henry VIII endowed several regius professorships at both Oxford and Cambridge. Every university and college has now a staff of professors. The title is also assumed by teachers of dancing and other arts, some being without academic qualification. A professor emeritus is one who has resigned after long service or through age or ill-health. See University.

Professor at the Breakfast Table, THE. Second series of O. W. Holmes's philosophical and humorous talks, of which the first was *The Autocrat of the Breakfast Table* (*q.v.*). After appearing in *The Atlantic Monthly* it came out in book form in 1860.

Profit and Loss Account. In accountancy, statement in which are summarised gains made and losses or expenses incurred by an undertaking. The profits or gains are entered on the right-hand or credit side of the account, and the losses and expenses on the left-hand or debit side. Thus

PROFIT AND LOSS ACCOUNT FOR THE YEAR ENDED 1950		£	£
To Selling Expenses ..	4,000	By Trading Profit b/d from	
.. General Expenses ..	8,000	Trading Account ..	30,000
.. Partners' Salaries ..	1,500	.. Interest received ..	200
.. Interest on Capital ..	900	.. Dividends on Investments ..	600
.. Income Tax ..	9,500		
.. Provision for Depreciation ..	3,500		
.. Net Profit, transferred to Partners' Current Accounts:			
.. S. Brown, £1,700			
.. W. Black, £1,700 ..	3,400		
	£30,800		£30,800

game as if it were their living. Whether professionalism on the whole has a good or bad influence upon sport, it has come to stay. The best professionals "play the game" as well as any amateur, and are rightly honoured for their achievements. See Amateur.

Professor. Term used for a teacher in universities and institutions for higher education. The

The profit and loss account or a company is usually divided into two parts; one shows how the net profit is arrived at; the other, often called the appropriation account, shows the purposes to which the net profit has been allocated, e.g. to dividends, staff superannuation funds, provision for income tax, reserve funds, etc. The Companies Act 1948. con-

tains detailed directions concerning the form and the contents of the profit and loss account of different kinds of companies.

Profiteering. Term introduced during the First Great War for the practice of making exceptional profits by taking advantage of abnormal shortages. Soon after the outbreak of war the first Rent Restriction Act (*q.v.*) was passed to prevent profiteering by landlords; and at various times orders were issued under the Defence of the Realm Act to control the prices of commodities, either by relating the current price to that charged formerly, or by fixing maxima. In 1919 the first Profiteering Act authorised the board of trade to investigate complaints of "unreasonable" prices, and to take legal proceedings against offenders, who could be fined or imprisoned. Local price control committees were established. This provision against profiteering came to an end in 1921; but the Rent Restriction Acts continued.

During 1939-45 the government practised a comprehensive system of price control and instituted much more comprehensive rationing than during the First Great War. These measures prevented many abuses of the earlier war. It was also found necessary to control the re-sale of second-hand goods by traders, particularly after the institution of purchase tax. But re-sale by others than traders was left uncontrolled; and second-hand furniture and motor cars were sold for much more than they cost originally.

Difficulty of Definition

This illustrates the great difficulty of defining profiteering. Should the reasonableness of a price be judged merely by considering the cash difference between the cost price and the resale price; or should one bear in mind the cost to the seller of replacing the article sold? Is it profiteering to sell for £500 a car that cost £170, if another could not be bought for less than £500? All profits are overstated during a period of rising prices and understated during one of falling prices. Further, it is exceedingly difficult to say what is a fair margin of gross profit. Overhead expenses of traders differ so widely when expressed as a percentage of their sales that a price ruinous to one might yield another a large profit. Hence prices must be fixed at a higher level than would be reasonable for some businesses. An attempt was

made to adjust matters by imposing a 100 p.c. excess profits tax, which took for the state at least part of the extra profit resulting from wartime shortages. But this did not benefit the individuals who were obliged to pay the high prices; the purchaser was better protected by price control orders and by rationing. Much profiteering after 1939 was associated with the attempt to evade control by "black market" transactions

H. Watson

Profits. In commerce or industry the surplus resulting from business transactions; the balance of the profit and loss account; the amount of gain from transactions during a financial period; the amount by which net assets have increased since the last balance-sheet was prepared. The exact meaning of the term depends upon the details of book-keeping by which the profit and loss account has been prepared, particularly upon what items have been charged as expenses or losses against income; and upon the method of valuing stock (goods intended for sale) and equipment (land, premises, machinery, furniture, vehicles, etc.).

Profits are exaggerated if stock-in-hand is overvalued or if inadequate allowance has been made for wear and tear or depreciation of machinery, etc. Sometimes the owners of small businesses overstate their profits by not charging as expenses (a) a salary for themselves similar to that which they could secure from an employer; (b) interest on the capital they supply, similar to that which they could expect if the money had been invested in some other way. Thus the assessment of the real profit in any particular business can be a nice problem, as the inland revenue department recognizes in making calculations in accordance with an elaborate set of rules to ascertain the statutory profit.

Economists point out that ordinary business profits often include (a) interest on the capital invested in the business; (b) economic rent of the land owned; (c) wages of management; (d) depreciation, wholly or in part; (e) reward for risk-bearing and insurance against loss through obsolescence, etc.; (f) monopoly gains; (g) accidental gain through unforeseeable change of circumstances; (h) "pure" profit, an amount accruing through exceptionally good management, a differential gain arising from superior effi-

ciency. This last, it is considered, does not enter into the determination of price. Often "book" profits are not enough to cover (a), (b), (c), (d), and (e), and there is no pure profit, particularly in one-man businesses. In large businesses, if there is, most of it accrues to the managers and not the shareholders.

Profit-Sharing. Term applied to a contract of employment "in which the employer agrees with his employees that they shall receive in partial remuneration of their labour and in addition to their wages a share, fixed beforehand, in the profits realized by the undertaking." Thus, the essential features of profit-sharing are (a) that it should provide for something wholly additional to wages; (b) that it should relate only to profits; (c) that the arrangements for sharing should be known beforehand. A premium bonus added to piecework wages is not an instance of profit-sharing; nor is a special bonus allocated as a mark of appreciation by directors after the result of the year's working is known.

Profit-sharing generally develops into co-partnership, the term used when the employees receive part of their entitlement in stock or share certificates of the company. Such certificates may become the absolute property of the employee, or may have to be surrendered when he leaves the service of the company.

Advantages and Disadvantages

Those who advocate this system consider that it (a) encourages employees to identify their own interests with those of the business; (b) discourages valued employees from leaving the company; (c) creates an interest in efficiency, reduction of waste, etc.; and (d) fosters thrift, self-respect, and a sense of property. It is easily possible to exaggerate the influence of such schemes, since generally the individual's share of profit is small in comparison with his ordinary remuneration; and it is difficult for the employee to associate individual acts with the company's total profit. Trade unions have opposed profit-sharing schemes that interfered with ordinary methods of fixing wages or with the right to join a union.

Profit-sharing originated in France more than a hundred years ago, and was extensively developed in Maison Leclair, painters and decorators, of Paris, and Maison Godin, an ironworks at Guise. In the U.K. it has been associated

principally with the gas industry, other public utility companies, municipal trading undertakings, and cooperative societies. Small businesses and a few large-scale companies have introduced profit-sharing and co-partnership schemes applying to certain groups of employees. In 1929, 517 undertakings, including 182 cooperative societies, were known to have profit-sharing schemes; but in 1938 the number had fallen to 399. *Consult Profit-Sharing and Stock-Partnership, G. James, 1926.*

H. Watson

Prognathism (Gr. *pro*, before; *gnathos*, jaw). Term denoting the projection of the upper jaw, especially in man and the anthropoid apes. By one calculation, a line being drawn from the forehead to the chin-point, the angle formed by the jaw, the maxillary angle, ranges from 160° in Europeans to 140° in the African negro. It is 110° in orang-utans. The European face is called orthognathous, the negro prognathous. *See Anthropology; Man.*

Prognosis (Gr., foreknowledge). Opinion expressed by a physician or surgeon as to the outlook of a case, as opposed to diagnosis (*q.v.*), which is the recognition and statement of the nature of a disease.

Programme Music. Name applied to musical compositions designed to suggest to the auditor a definite series of events or scenes. This class of composition has reached mature development only in modern times, but early composers frequently imitated the songs of birds, battle-cries, etc., to add descriptive force. Beethoven himself used the notes of the cuckoo in the Pastoral (No. 6) Symphony, and declared that his composition was always based on mental pictures. But the term should be confined to works where the "literary" basis is clearly defined, e.g. the popular Battle of Prague, for piano and strings, by Franz Kotzwara (d. 1791), or on higher planes, Mendelssohn's Midsummer Night's Dream and Tchaikovsky's Romeo and Juliet overtures, Schumann's Carnival, many orchestral works of Berlioz, an enthusiast of the programme in music, Liszt's symphonic poems, Saint-Saëns's Danse Macabre, Richard Strauss's Don Quixote. *See Leit-Motiv.*

Progress and Poverty. Work on social philosophy by Henry George (*q.v.*), further described as An Inquiry into the Cause of Industrial Depressions and of the Increase of Want, with the Increase of Wealth, the Remedy.

Published in 1879, it finds the principal cause of poverty and wretchedness in the private ownership of land, and advocates a single tax on the use of land as the remedy. *See Single Tax.*

Progression. Name given in mathematics to certain kinds of series. An arithmetical progression (A.P.) is a series in which a term differs from the preceding term by a constant amount; thus, 3, 7, 11, 15 . . . is an A.P. with a common difference of 4. If *a* denotes the first term of a progression and *d* the common difference, the *n*th term = *a* + (*n* - 1) *d*. In a geometrical progression (G.P.), successive terms are formed by multiplying the preceding term by a constant number, called the ratio; thus, 2, 6, 18, 54 . . . is a G.P. with a constant ratio of 3.

The *n*th term of a G.P. is *a.rⁿ⁻¹* where *a* is the first term and *r* the common ratio. The principle occurs frequently in calculations involving compound interest. A harmonic progression (H.P.) is a series in which the difference between the first and the second of any three terms is to the difference between the second and the third as the first term is to the third; if *a*, *b*, and *c* are any three consecutive terms, $\frac{a}{c} = \frac{a-b}{b-c}$, e.g. 3, $3\frac{1}{2}$, 5.

The H.P. is important in geometry and the theory of sound. *See Geometrical Progression; Series.*

Progreso. Seaport of Mexico, in the state of Yucatan. Its shipments of sisal fibre are considerable and have an annual value of several millions of pesos. It is connected by rly. with Merida, the capital of the state, 35 m. to the S. Population 15,000.

Prohibited Degrees. Degrees of blood relationship within which marriage is forbidden by the law or the Church. For the latter, *consult* the Table of Kindred and Affinity in the Book of Common Prayer. The law, less stringent than the Church, is intended mainly for the prevention of incest (*q.v.*). *See also Marriage.*

Prohibition. Term applied particularly to prohibition of the manufacture and sale of alcoholic liquors as beverages throughout an administrative area. The movement for prohibition originated in the eastern states of the U.S.A. early in the 19th cent., when various measures were introduced. The most successful was passed by the Maine legislature in 1851. Several states adopted similar measures during the next few years, but all quickly failed, ex-

cept in New England. Increase in drinking after the Civil War revived the prohibition movement, and in 1872 a prohibition party first nominated candidates for the presidency and vice-presidency. The activities of the Women's Christian Temperance Union, founded 1874, reinforced from 1895 by those of the Anti-Saloon League, was to the forefront in publicity for the movement, which made great headway during the 20th century. By 1917, 27 states out of 45 had become "dry," including the whole of the west except California.

On June 30, 1919, there came into effect a wartime prohibition law, passed by congress the previous Nov., of which the main purpose was to conserve grain. Meanwhile the prohibitionists had concentrated their efforts upon working prohibition into the Federal constitution. On Dec. 17, 1917, a joint resolution was carried through congress for the submission to the various states of an amendment to the constitution, subsequently known as the "eighteenth amendment" (*q.v.*). By Jan., 1919, the requisite 36 states had approved the amendment, which came into effect Jan. 16, 1920 (though already anticipated by the wartime act). The Volstead Act, which provided the appropriate legislation, came into force the following day.

The difficulties of enforcement, however, proved insuperable. Legal problems arose in connexion with the operation of "concurrent power," the industrial applications of alcohol, the inspection of foreign vessels nearing the "three-mile limit" of the American coast, and "rum-running" from the Canadian and Mexican borders. Racketeering in illicit spirits became the basis of many fortunes and much organized immorality; and it became so doubtful if prohibition really "prohibited" that a nation-wide reaction set in. A new amendment, the 21st, repealing the 18th, was submitted by congress to the states in Feb., 1933, and was adopted so speedily that it became law Dec. 5, 1933. The situation thereafter was that each state enjoyed complete home rule in the matter of its liquor laws (some of which, especially in the W. and E., are more drastic than the Volstead Act) and was protected against the intrusion of intoxicants from other states.

Prohibition was also introduced in Canada between 1907 and 1917. By the latter date the whole

dominion except Quebec had abolished the open liquor traffic, and in Quebec almost the whole province outside Montreal was under prohibition by local option. British Columbia was the first prov. to repeal the law, 1920, and prohibition now applies only to Prince Edward Is. Elsewhere beer is sold freely in saloons, but is not served with meals (except in Quebec). There is a provincial monopoly in the sale of wines and spirits, and purchasers must obtain an annual licence. Newfoundland had prohibition from 1917 to 1925, but it has never obtained in Australia (except for a brief period in Canberra) or New Zealand. From 1948 prohibition was gradually introduced in India and Pakistan. The movement has made little headway in the U.K., though Edwin Soryngour, a temperance advocate, sat as a prohibitionist M.P. for Dundee, 1922-31. See Local Option

Prohibition. Order by the common law of England, used also in America and all parts of the British Dominions where English common law prevails. By it one of the superior courts (exchequer, common pleas, and king's bench) forbade an inferior court to take cognizance of a case. In England the order is now in practice confined to cases where an inferior court—e.g. a county court—is assuming jurisdiction over a cause which it has no jurisdiction to try. The defendant applies to the high court for leave to apply for an order. In special cases the judge may make an order of prohibition forthwith; usually he merely grants leave to apply. At the hearing of this application for the order the case is argued, and it is decided whether the inferior court has jurisdiction or not.

Projectile. Term in ballistics to describe a shell or other explosive container discharged from the barrel of a firearm. It is also used in relation to an arrow discharged from a bow or pellet shot from an air gun. Projectiles range in size from dust shot weighing a few grains to the two-ton shell discharged from a 16-in. naval gun. A projectile depends upon external energy for its initial projection: thus a hand grenade (thrown), and an aerial bomb (dropped), are not classed as projectiles but as missiles. A bomb discharged from a mortar becomes a projectile.

Projection. Term applied to the graticules or frameworks of lines of latitude and longitude upon which maps are drawn, and now used for any map network and not

restricted to those which are true geometrical projections, e.g. Mercator's and simple conic projections. See Maps.

Since a map is flat, and the earth's surface is curved, it is not possible to make a map in which there is not some distortion, and it is the business of the cartographer to design various methods by which the inevitable distortion is at a minimum. In so doing he concentrates upon the network of meridians and parallels. The simplest methods of drawing the network are based upon the easy projections, although in nearly every case the final product contains modifications introduced after mathematical calculations.

If we imagine a ground glass globe on which the meridians and parallels are marked in black, and at the centre of which is placed a brilliant point of light, then we can use photographic paper to record the simple projections. If the paper is made into a cylinder to touch the globe at the equator, the record will show horizontal lines for the parallels and vertical lines for the meridians. This is the cylindrical principle of projection. If the paper be made into a cone, and fitted to touch the globe along one parallel of latitude, the record will show circular lines for the parallels, and straight lines converging to a common point for the meridians. This is the conical principle of projection. If the paper be flat and arranged to touch the globe at a pole, then the parallels are recorded as circles, and the meridians are radii of the circles. This is called the zenithal principle.

The cylindrical principle yields distortion of size for high latitudes, and distortion of shape by rapidly increasing E.-W. distances everywhere; these distortions are reduced in Mercator's projection, where the cylindrical principle is modified in order to give true compass directions from place to place. Mercator's maps are useful for navigators' charts. In the case of the conical principle distortion increases with distance from the parallel of contact. A modification is introduced by the use of a cone imagined to pierce the globe and pass through two parallels, and this development gives satisfactory maps for areas which are not very wide from E. to W. and not far N. or S. of the two chosen parallels. These conical projections are modified further in several ways, and tables have been constructed from which various networks may be drawn

The zenithal principle is modified to show distances or areas to scale, and is general for polar maps or maps of continents.

Projection. ANGLE OF. Elevation of the line of departure of a projectile with reference to the lateral line of sight. When a gun or rifle is fired, the projectile does not travel in a direct horizontal line from barrel to target, but rises in a gradually increasing arc, which sharply decreases in radius after the projectile has reached the apex of trajectory. The angle formed by the line of sight and a line drawn from the apex of the trajectory is the angle of elevation. Increasing this angle increases the range. Naval guns generally fire at a high angle of projection, and all howitzers show a high figure.

Projector. In cinematography (q.v.) the instrument by which a moving picture is thrown on to the screen. In optics, any apparatus used for directing rays of light. See Epidiascope; Searchlight.

Prokofiev, SERGEI SERGEYEVITCH (b. 1891). Russian composer. Born April 11, 1891, at



Sergei Prokofiev,
Russian composer

Soutsova, he studied at St. Petersburg (Leningrad) under Rimsky-Korsakov, becoming a brilliant pianist. After the Revolution he lived successively in London, Paris, Japan, and the U.S.A., returning to Russia in 1933 and settling at Moscow. Prokofiev was induced by the Soviet government to popularise his style, but, his music not proving acceptable to audiences, he was accused in 1948 of exploiting an "individualism intolerable to Soviet society." Prokofiev's first piano concerto gained the Rubinstein prize in 1910. His opera, *Love of the Three Oranges*, produced at Chicago in 1921, was soon popular. During the 1920s he composed ballets for Diaghilev; the well-known classical symphony also belongs to this period. His later works include the opera *War and Peace*; the overture *Toast to Stalin*; *Peter and the Wolf*; and music for films including *Ivan the Terrible*, and *Alexander Nevsky*.

Prokop, ANDREW (1380-1434). Bohemian monk and leader. He studied in Prague and travelled extensively in Europe. He joined the army of Jan Ziska on the outbreak of the Hussite war, and after

Ziska's death in 1424 became general of the Taborites, who under his guidance won a series of victories over Saxons, Germans, and Austrians. In 1427 he was master of Prague, and in fact of Bohemia. His followers carried out numerous devastating raids on neighbouring states, and in 1431 the war was renewed, and Prokop's army advanced as far as Frankfort-on-Oder. On May 30, 1434, Prokop was defeated at Lippau by an army raised by the Bohemian aristocracy, and fell on the field of battle.

Proletariat (Lat. *proles*, offspring). Term used by political economists and socialists to signify the poorest and lowest class of a community, and recently extended to include all the wage-earners of a nation. It dates from the time of Servius Tullius, when the Roman state was divided into the classified citizens who had property (*locupletes*), and the unclassified who had not, but served the state with offspring instead. See Communism; Democracy; Marx.

Prologue (Gr. *pro*, fore; *logos*, word). Preface or introduction, more especially one spoken before the opening of a dramatic performance, either to indicate its nature or to commend it to the audience. The use of the prologue dates back to the classic dramatists, when all that preceded the first choral song was called *prologos*, and though it continued fairly general with new pieces in the English theatre up to the 19th century, it later dropped almost entirely out of use.

Prome. District and town of Lower Burma, in the Pegu division. The dist. occupies the Irawadi valley just above the delta. It connects the central basin, the original home of the Burmese, with the deltaic plains, the ancient kingdom of the Talaings. Rice is almost the only cereal cultivated. Area, 2,915 sq. m. Pop. 436,714.

The town, on the left bank of the Irawadi, is the terminus of the rly. from Rangoon. Here is the Shive-sandaw Pagoda, 180 ft. high and surmounted by 83 small gilt temples, much visited by pilgrims. There was a factory of the East India Company in 1612 at Prome, which has a large trade in silk and cotton goods, lacquerware, and paper. In the Second Great War the town was captured by the Japanese on April 2, 1942, the British being forced to withdraw N. It was liberated May 3, 1945, during the British 14th army's land advance on Rangoon. Pop. 28,295.

Promenade Concert. Type of popular orchestral concert, a feature being that the audience, or part of the audience, is not seated, and is therefore free to move about as desired. Although the concerts given at Ranelagh, Vauxhall, Marylebone, and other public gardens in the 18th and early 19th centuries were precursors, this entertainment as known today was introduced to London from Paris in the 1830s. Concerts *à la Musard* were given at the Lyceum in 1838. Jullien's concerts were popular at Drury Lane during 1841-59, as were those given by Balfe at Her Majesty's in 1850.

On Aug. 10, 1895, a series destined to become world-famous was inaugurated at Queen's Hall under the direction of Henry J. (later Sir Henry) Wood. At first frankly popular, the programmes developed with each later summer season until they contained the best classical music and contemporary compositions. They continued under Wood's direction until his death in 1944. In 1927 the B.B.C. took over the concerts and made them a national institution. German air raids curtailed the 1940 season, and next year the destruction of Queen's Hall on May 10 necessitated a transfer to the Royal Albert Hall, where an outstanding season was given, July 12-Aug. 23. For the first time there was employed an associate conductor, Basil Cameron. In 1942 Sir Adrian Boult also took part. The 1944 Jubilee season had to be abandoned on account of flying bombs, and Wood died on Aug. 19. Later conductors at the "Proms" included Sir Malcolm Sargent, Constant Lambert, and Stanford Robinson.

Other regular series of promenade concerts have been given at Boston, Mass., and Sydney, Australia.

Promethean Match. Former device for obtaining fire quickly. It replaced the chemical matches which had come into use about 1807. It consisted of a small, tight roll of paper coated with sulphur, and containing at one end a sugar and potassium chlorate mixture, and a thin glass bulb filled with sulphuric acid. To obtain a light the glass was broken by pinching the end of the match, when the mixture fired owing to contact with the acid. See Bickford Fuse; Match; Safety Fuse.

Prometheus. In Greek mythology, originally a god of fire, later a Titan. The chief legend about him is that he stole fire from heaven for the use of mortals

For this he was chained by Zeus to a rock in Scythia, and every day an eagle consumed his liver, which grew again in the night. Prometheus suffered this torture until he was rescued by Hercules, who killed the eagle and released him from the rock. There are various and somewhat conflicting forms of the legend. See Aeschylus; Pandora. *Pron.* Pro-mee-thewss.

Prometheus Unbound. Lyric drama by Shelley, considered by many his greatest work, written 1819. Prometheus, the spirit of man, who has made Jupiter powerful and become his captive, revolts and is freed by the mysterious Demogorgon, who destroys Jupiter. Prometheus is reunited to his wife Asia, or Nature, and the new age of human freedom and happiness begins.

Prometheus Vincitus (Prometheus Bound). Tragedy by Aeschylus, produced about 430 B.C. It was the first or second piece of a trilogy, the other two being Prometheus the Fire-Bringer and Prometheus Unbound. For having taught mankind the rudiments of civilization, especially the use of fire, contrary to the will of Zeus, Prometheus was chained to a rock in Scythia, and predicted the dethronement of Zeus. At the end the rock sinks with him into Hades, where he suffers further tortures.

Prominence. In astronomy, the name given to the gaseous structures round the rim of the sun. They are great quiescent or eruptive gas clouds which reach sometimes 50,000 m. alt. and consist chiefly of hydrogen and helium. Invisible to the naked eye except during a total eclipse, they can be seen at all times in a spectroscope, and their motions have been filmed. See Sun.

Promissory Note. "An unconditional promise in writing, made by one person to another, signed by the maker, engaging to pay on demand or at a fixed or determinable future time, a sum certain in money, to or to the order of a specified person or to bearer." The person making the promise is the maker. The person to whom the promise is given is the payee. The usual form of such a note is:—

London, May 1, 1948.
Three months after date I promise to pay Mr. John Jones or order the sum of One hundred pounds for value received. £100.

(Signed) Septimus Smith.

As between the maker and the payee, if the payee sues on the note, the maker can always defend on the ground that there has been no valuable consideration, or use

any other defence that would be open on an action of contract. But if the payee indorses the note to a third party, called indorsee, the latter can sue the maker for the money without regard to the original want of consideration. Thus, a promissory note is negotiable. Speaking generally, a note which has once been indorsed to an indorsee has all the characteristics of a bill of exchange; and the maker and all indorsers are liable to a holder in due course for its face value.

Promontory. The general geographical term for a cape, as in Cape Clear; headland, Beachy Head; point, Start Point; ness, Buchanan Ness. Promontories vary from sandy spits like Dungeness to the fractured ends of hill-ridges as in the North and South Forelands, the eroded fragments of a ridge as at the Needles, and to bluff headlands like the North Cape. See Geography.

Promoter. In a legal sense, one who is a principal, not a subordinate or other employee, who alone, or with others, forms or floats a company or undertaking. A promoter conceives the idea of the company, sets out a scheme, procures persons to act as the first directors, causes the memorandum and articles to be prepared, and undertakes to form a company with reference to a given project, and to set it going, and to take the necessary steps for that purpose.

A promoter stands in the position of a trustee towards the new company, must act in the utmost good faith, and must not make a profit without disclosing it, and if he does make a secret profit, will be compelled to disgorge it. See Company Law; Prospectus.

Promptorium (PROMPTUARIUM) **Parvulorum** (Lat., storehouse of the young). The first English-Latin dictionary. Supposed to have been compiled about 1440 by a Dominican friar named Galfridus (Godfrey) Grammaticus of Lynn Episcopi in Norfolk, it illustrates the language of the period, especially the East Anglian dialect, and contains numerous examples of medieval Latin.

Promulgation (Lat. *promulgare*, to put before the people). In law, the steps taken to make a law known to those who have to obey it. In English law, everybody is deemed to know when a new law comes into operation, and promulgation is not necessary to its validity. For statutory instruments the Statutory Instruments Act, 1946, provided that copies

must, as soon as possible after the instrument is made, be put on sale to the public. Where a person is charged with contravening any such instrument, it is a good defence to prove that the instrument had not been issued by the stationery office, unless it is proved that at the date of the offence reasonable steps had been taken to bring the instrument to the notice of the public. This Act was made necessary by the delay in printing the many regulations and orders made during and after the Second Great War. See Proclamation.

Pronephros. The most anterior part of the primitive kidney. See under Wolffian duct.

Prong Buck (*Antilocapra americana*). North American ungulate mammal. It is usually placed by zoologists between the antelopes and the giraffes. Though only one species is known, it forms a separate family, the Antilocapridae. It resembles an antelope, but the horns consist of bony cores supporting sheaths which are periodically shed and renewed. The cores are covered with hairy skin, as in the giraffes. The animal is about 36 ins. high at the shoulder, and the pelt is handsomely coloured. The upper parts are chestnut; the face is almost black, with white cheeks; and the lower parts and a large patch on the rump are white. The white throat is crossed with brownish-yellow bars. The prong



Prong Buck. Young specimen of this small North American mammal

buck is found only in the western parts of North America.

Pronoun (Lat. *pro*, for; *nomen*, noun). In grammar, a class of words used in place of a person or thing. They are divided into personal (I, you); demonstrative, indicating objects (this, that); relative (who, which); interrogative (who? which?); indefinite (any, either); possessive (mine, yours). The personal pronouns include reflexive (him-, herself, themselves), and reciprocal (one another). Many languages show a distinction of gender in the demonstrative, relative, interrogative, and indefinite pronouns, the others having no gender. See Noun.

PRONUNCIATION: RULES OF SPEECH

A. B. Gough, M.A., Ph.D., late of The Oxford English Dictionary

In this article are outlines of some rules which should serve as a useful guide to pronunciations. See also Consonant; Larynx; Phonetics Voice; Vowel; and the article on each letter of the alphabet

Pronunciation (Lat. *pronuntiare*, to utter) is the manner in which an individual or a linguistic group utters articulate words or sounds. There are four principal elements in pronunciation, viz. quantity or length; stress, accent, or loudness; intonation or tone; articulation. Quantity applies to consonants as well as vowels, but is more important in the latter. English makes a greater difference than many languages between long and short vowels. Stress depends on the volume of sound emitted at one time, and has nothing to do with the duration of the sound, although long syllables tend to acquire stress. It is very marked in English speech, and is often exaggerated by English speakers of other languages. Intonation includes the rising or falling in the musical pitch of the voice. Most European languages

agree with English in using falling tones for statements and rising tones for questions, although Swedish employs rising tones very extensively.

Articulation is the production of distinct sounds by the organs of speech. Its scientific study belongs to Phonetics (*q.v.*). The present article is concerned with practical hints on the pronunciation of foreign words. Much greater space and the free use of symbols would be necessary for the precise and full treatment of the subject, and the following statements indicate only very roughly the characteristic sounds of some important languages. An ideal alphabet would have one symbol for each sound: 28 vowels and 32 consonants are not heard in standard English, which itself has about 31 sounds. All that can be done here is to omit

from consideration sounds of rare occurrence, to group together as one sound those which closely resemble each other, and to indicate the mode of formation of certain sounds, fundamentally different from any English sound. Where digraphs, i.e. combinations of two letters to express one sound, are used, it must be remembered that the sounds thus expressed are simple, e.g. *ay* is not *a+y*.

English spelling, especially in regard to its vowels, is much less phonetic than that of any of the other great European languages. English has also developed an unusually large number of obscure and mixed vowels, diphthongs, and glides. The English vowel system is confronted with a very different and tolerably uniform Continental vowel system, of which the purest types are to be found in Spanish and Italian. Important exceptions will be noted in their places.

It is usual, though by no means a universally followed plan, to spell in English books the proper names belonging to languages which use other alphabets than the Latin (including black letter), or which are not written at all, with English consonants and Continental vowels. If these are mastered there should be little difficulty in pronouncing names in modern Greek, Russian, Serbian, Bulgarian, and the various Asiatic and African languages, except for accentuation and for certain sounds, as in Arabic, Hindustani, and Russian, for which we have no equivalents.

ENGLISH VOWELS.		Continental
Long	Short	
ah <i>father</i>	a <i>arise</i>	a
ai <i>air</i>	ä <i>cat</i>	ä
aw <i>saw</i>	o <i>not</i>	o (Swed. ä)
ay <i>date</i>	e <i>bell</i>	e
ee <i>peel</i>	i <i>pill</i>	i
oh <i>poker</i>	o <i> fellow</i>	o
ö (er) <i>hurt</i>	u (er) <i>summer</i>	ö
oo <i>blue</i>	ü <i>put</i>	u
ü Ger. <i>über</i> , Fr. <i>du</i>	ü Ger. <i>üppig</i> , Fr. <i>tulle</i>	ü
English Diphthongs		Continental
i <i>fine</i>		ai
ow <i>now</i>		au
oi <i>boil</i>		oi

Of these vowels the only one that presents real difficulty, apart from niceties, is *ü*. It is the Continental *i* rounded, and may be pronounced by attempting to utter the *ee* of *peel* or the *i* of *pill* with the lips protruded and rounded as in *oo*. The sound is heard in Scottish and Devonshire forms of *good*. Nasalised vowels, common in French, Portuguese, and Polish, are absent from standard English, though heard in some forms of American English. In them the vowel coalesces with a following *m*, *n*, or *ng*, to form a single sound,

not a vowel followed by a nasal consonant. They are formed by leaving a slight opening between the lips (with *m*), or between the tongue and palate (with *n* and *ng*), thus allowing some of the air to pass through the mouth as well as the nose.

CONSONANTS. *Kh* is used in this article to denote both the guttural and palatal voiceless fricatives (or spirants) heard respectively in Ger. *ach* and *ich*. The former occurs in Scottish *loch*. One symbol suffices, as the difference is automatically produced by the following vowel. The sounds are formed by putting the tongue in the positions of *ahk*, *eek*, but not allowing it quite to touch the palate. *Gh* represents the voiced fricative corresponding to the guttural *kh*, as in Ger. *sagen*, and is formed as above, substituting *ahg* for *ahk*.

Th is reserved here for the voiceless fricative heard in *thick*, and *dh* represents the voiced sound in *then*. Similarly *zh* stands for the voiced sound in *pleasure*. *Ly* represents the palatal *l* spelt in French and Spanish *ll*, in Italian *gl*, and in Polish *l*. It is one simple sound, and not quite the *l+y* heard in English *million*, but is formed by placing the tongue in a position between those for *l* and *y*. In French, S. American Spanish, and Hungarian, it often passes into *y*. *Ng* is the simple guttural sound of *sing*. *N̄* is the corresponding palatal nasal, formed by pressing the tongue against the front palate, between the positions for *n* and *ng*. It resembles the *ni* in *senior*, but is one simple sound.

ITALIAN. The stress is generally on the penultimate, except when that syllable is short in Latin, when it is on the antepenultimate, as in the diminutives in *olo*, *ola*. Occasional stress on the last syllable is marked by a grave accent, e.g. *pode-tà*. The two vowels in diphthongs are separately pronounced. A doubled consonant is pronounced twice. *C* before *e*, *i*=tsh; *c* before *e*, *i*=t+tsh; *ch* before *e*, *i*=k; *g* before *e*, *i*=j; *gi* before *a*, *o*, *u*=j; *gh* before *e*, *i*=g hard; *gl*=*ly*, rarely *gl*; *gn*=*ñ*; *h* is silent; *j*=Ital. short *i*; *s* initial or before a consonant=*s*; *s* medial before a vowel generally=*z*, sometimes *s*; *sc* before *e*, *i*=sh; *sch* before *e*, *i*=sk; *z*=ts or dz, but sometimes=*z*.

RUMANIAN. *Â* nearly=*ü*; *ă*=short *ö*; *e* initial=short *ye*; *â*, *î* nearly=*ü*; *i* and *u* final are silent; *y*=*i*; *c* before *i*=k; *c* before *e*, *i*=tsh; *d*=z; *g* before *e*, *i*=j; *gh*=g hard; *h*=kh; *j*=zh; *ș* and *șch* before *e*, *i*=s; *s* before *e*, *i*=sk; *ț*=ts.

SPANISH. The stress is penultimate in words ending in a vowel, or in *n* or *s* without written accent; in others it is final. Exceptions are marked by an acute accent. *B=v* formed with both lips; *c* before *e*, *i*=th, but in S. America=*s*; *ch*=tsh; *cu* before *a*=qu (kw), but before *e*, *i*, *o*=ku (often written *cü* or *cú* before *a*); *d* between vowels or final often=*dh*; *g* before *e*, *i*=Span. *j*; *gu* before *e*, *i*=g hard, but *gü*=gu; *gu* before *a*, *o*, *u*=gw, often almost *w*; *h* is silent except in combination with a consonant; *j* is a strong guttural *h*, almost *kh*; *ll*=*ly*, in S. America *y*; *ñ*=*ñ*; *qu* before *e*, *i*=k; *x* now=*x*, but formerly was often written where *j* is now used, e.g. *Xerez*=*Jerez*, pronounced *herayth*; in S. America *x* often=*s*; *z*=th, in S. America, *s*.

PORTUGUESE. The stress is on the penultimate if the word ends with a vowel, or in some cases on the antepenultimate; in words ending with a consonant it is final. *A*, *e*, *o*, *u* may be nasalised (see above); the nasal *a* is written *am*, *an* when final or before any other consonant than *m* or *n*, otherwise it is written *ã*; nasal *e* is written *em*, *en*; nasal *o* is *ô*; nasal *u* is *um*, *un*; *ãe*=Eng. long *i* nasalised; *ão*=ow nasalised; *õe*=oi nasalised; *e* final is almost silent; *o* final=*oo*; *ô*=long *o*; *ô*=o as in Eng. *not*; *ou*=o as in Eng. *no*; *c* before *e*, *i*=s; *ch*=sh; *g* before *e*, *i*=zh; *gu* before *e*, *i*=g hard; *h* is silent except in combination; *j*=zh; *lh*=Span. *ll*; *nh*=*ñ*; *qu* before *e*, *i*=k; *s* medial=*z*; *s* final or before voiceless consonants except *s*=sh; *x*=sh.

FRENCH. The stress is always on the last syllable, not counting final *e*, which is silent. The written accents do not denote stress, but the nature of the vowel. Vowels with the grave (*père*) and circumflex (*rôle*) accents are always long; those with the acute accent (*â*) always short. *E* in unstressed syllables has a dull sound almost like a short *ö* (Eng. *her*); *é* is like *e* in *fell*, but with the tongue arched; *i*, whether long or short, is formed with the tongue more arched than in Eng. *ee*, *i*; *u*=*ü*; *y* vowel=Fr. *i*; *ai*=ai (*fair*); *ay* has the same sound unless a vowel follows, when the sound of *y* consonant is interposed, e.g. *payer*, *pai-yai*. In proper names *y* often=*ah+y*, e.g. *Exyèur*, *bal-yô*; *au*, *eau*=o long or short; *ei*, *ey*=Fr. *i*; *eu*=o long or short. *oei*=*ö*+*ee*; *oeu*=*ö*; *oi*, *oy*=wa(h); *ou*=oo, but before a vowel=*w*; *ui*, *uy* strictly Fr. *u*+Fr. *i*, but approximately=*wee*. The diaeresis on the second of two vowels indicates that they

are sounded separately, e.g. *Moïse*, *moh-eez*. Final e, es, and ue, ues are silent.

Nasalised vowels are those followed by m, n, either final, or before any consonant except m, n. In these syllables the m, n coalesces with the preceding vowel to form a single nasal sound. Nasalised e has two values, viz. en final (but not the preposition and adverb en), which is the short a of Eng. *an* nasalised, and en before a consonant other than n, which = the Fr. nasalised a. Nasalised i, ai, ei = Eng. short a (as in *an*) nasalised.

Final d, s, t, x, z, are generally silent unless the following word in the same clause begins with a vowel; final r is generally silent after e. C before e, i, y = s; c = s; ch = sh; g before e, i, y = zh; gn = ñ; gu before e, i, y = g hard; h is silent except in combination; j = zh; ll often but not always = ly; qu = k; s between vowels = z; th = t; ti in the endings -tion, -tiel, -tien, etc. = Fr. si; w = v; x = ks or gz, but between vowels = s, z.

GERMAN. The stress is generally on the root syllable, and in compounds on that of the first element, if that is a word in itself. Generally speaking, the accentuation resembles that of English. Ae, ā = ai (*fair*); ai = i (*fine*); au = ow; āu = oi; e final nearly = short ō; ei = i (*fine*); eu = oi; ie medial = ee; oe, ö = ō; ue, ü = ü; y vowel = Ger. i, sometimes ü; b final or before a cons. ending the same syllable = p; c before ae, ā, e, i = ts; ch = kh; chs = ks; d final = t; g initial = g hard; g between vowels = gh (fricative); g final = kh; h is silent between a vowel and a consonant, only indicating the length of the vowel; h is also silent when final after a vowel, and between vowels when the following vowel is unstressed; j = y; ng is always as in *sing*; qu = kv; s before a vowel = z; s before p, t = sh; sch = sh; th = t; v = f except between vowels; w = v, but is silent in some names ending in -ow; z = ts.

DUTCH and FLEMISH. The stress is as in German. Ae (modern Du. aa) = ah; unstressed e nearly = ō; euw = ay + Du. w; ei = long i (as in *fine*); eu = ō; ie before r = ee; ij = long i (*fine*); oe = oo; oo = oh; ou, ouw = ow; u, uu = ü; ui, uy nearly = oi or ah + ü; b, d as in German, but d between oe, ō, ui and a vowel = y; g initial = kh, otherwise nearly as in Ger.; j = y; s always = s; sch before vowels (except the obscure or dull e in unstressed syllables) = skh, otherwise sch = s; sj = sh; th = t; tj = tsh, w = w without rounding the lips.

DANISH and NORWEGIAN. The stress is as in German. aa = aw; æ is a close e nearly like Fr. é or Eng. e in *bell*; aj = long i; av before a consonant = ow; ej = long i; ø, ö = ō; øj = oi; y = ü; c before e, i = s; ch = k; d, dd between vowels or final = dh; d is silent after l, n, in the same syllable, and before s; f at end of a syllable = v; g before ā, e, i, ō, y = y; gi = y; hj = y; hv = v; j = y cons; k before e, i, j = tsh; kv = kv; sj, sk, skj = sh; th = t; z = z, ts, dz.

SWEDISH. The stress is as in Ger. Aa, ā = aw or o in *not*; æ, ae as in Dan.; o final and in some other cases = oo, u; y = ü; c before e, i, y = s; dj = y; dt = t; f final = v; g before ā, e, i, ō, y, or after l, r at end of a syllable = y cons.; g before t = k; gj = y; hj = y; hv = v; j = y; k before ā, e, i, ō, y in same syllable nearly = tsh; lj initial = y; qv = kv; sk initial before ā, e, i, ō, y = sh; sj, skj, stj nearly = sh; tj = tsh; z = s.

CROATIAN and DALMATIAN. Ie, é = ye; b, d as in Ger.; c, cz = ts; č nearly = ts; č, cs = tsh; dj, ds, dz, gj = j; h = kh; j = y; ű, nj = ñ; r is sometimes a vowel; š = sh; sz = s; v = f or v; ž = zh; but ž final = sh.

CZECH. The stress is on the first syllable. v Written accents mark length. E = ye; ey = ay; ou = o + oo; ů = oo; y = ü; c = ts; ck = tsk; č = tsh; ch = kh; d as in Ger., but di, di = dyi, dyee; h final = kh; ň = ñ; ř = rzh; š = sh; ti, tí = tyi, tyee; ž = zh; ž final = sh.

POLISH. The stress is usually on the penultimate. Written accents mark length. ę, ę are nasal vowels; é = yay; ó, o are close vowels, approaching oo, u; y = ü. Consonants with the acute accent are palatalised, the sound being something like that produced by a closely following y. C = ts; c = tsh; ch = kh or k; cz = tsh; d as in Ger.; dz = j; h = kh; j = y; l = ly; barred l nearly = w; ŋ = ñ; rz = rzh; sz = sh; v = f; w = v; ż = zh.

WELSH. The stress is generally on the penultimate. Ae = long i, as in *fine*; au = ah + ü; aw = ow; ei = long i as in *fine*; oe = oi; u = ü; ui = i; w as vowel = oo; y = u as in *but*. The other vowels have the Continental values. C = k; dd = dh (*then*); f = v; ff = f; ll = voiceless l, i.e. l without vibration of the vocal cords, the effect being something like khl or thl, the first consonant being sounded faintly.

IRISH. The stress is usually on the first syllable, but usage varies locally. Written accents mark length. Vowels have the Continental values, except that ā, a = aw, o (in *not*); and that o has a close

sound, almost like u in *but*. Combinations of vowels are very numerous: ai, ea = short a, aoi = ee; ea = ah; éa, eu = ay; ei = short e; eo = short u as in *but*; éo = yoh; eoi = oh + short i; io = ee; io, ui = short i; iai = ee + short i; iú = yoo. The consonants b, c, d, f, g, m, p, s, t are aspirated, i.e. turned into fricatives by a following h, representing a point over the letter in the Irish alphabet; thus bh = v; ch = kh; mh = v; ph = f. Bp = b; c = k; dl, dn = ll, nn; dt = d; f is bilabial; g is always hard; gc = g; ln = ll; mb = m; s before or after e, i = sh.

HUNGARIAN. The stress is on the first syllable. Written accents mark length. Á = ah; a nearly = o in *cot*; áj = long i as in *fine*; aj = oi; cs = tsh; cz = ts; g is always hard, but gy is a palatalised dental somewhat like dy; j = y; ly is the palatal ly, almost passing into y; ny = ñ; s, ss = sh; sz, ssz = s; ty is the voiceless palatal corresponding to the voiced gy (dy), and resembles ty; ts = tsh; tz = ts; y is never a vowel, but is used to modify the preceding consonant; zs = zh.

CLASSICAL NAMES. The pronunciation of ancient Greek and Latin hitherto current in England is admittedly conventional, words being pronounced much as if they were English, with the following exceptions: e is never silent; when final it is always long; y is always a vowel, and pronounced like Eng. i. The diphthongs are represented by the following sounds, which are not all diphthongs: ae = ee; au = aw; eu = (y)ew; oe = ee; Gr. ei = long i; Gr. ou (more often spelt u) = oo. In some words the two vowels form separate syllables, when the second is often marked with the diaeresis, e.g. *Phaëthon*. In other combinations of vowels both are distinct, length being never indicated by doubling, e.g. *Bootes* = bo-ōteez; *Boeotia* = bee-ōsha. The termination -eus is (1) yéws (*Zeus, Orpheus*), (2) e-us (*Timotheus*), or (3) ee-us (*Peneus*). The termination -es in personal names is always eez. Ch = k; initial ps, pt = ps, pt, or s, t; sc before e, i, y = s; initial x = z.

The accent is usually on the antepenultimate, or the first in words of two syllables. In words of three or more syllables it falls on the penultimate, when the vowel of that syllable is followed by two consonants, unless the second alone is a liquid.

Consult Practical Training in Pronunciation, G. N. Trenité, 1932; Language, L. Bloomfield, 1935; various B.B.C. pronunciation lists.

Proof. Term used in English law and the systems derived from it. It indicates the means whereby a fact is brought to the knowledge of a court of law, so that the court may properly take cognizance of it. As a rule the contents of a document are proved by producing the document itself. A copy will not be received in proof unless either (a) the original is proved to be lost or destroyed; or (b) the original is in the hands of the opposing party, who refuses to produce it after due notice. Exceptions to this rule are to be found with certain public documents, e.g. a marriage register need not be produced—a certified copy is enough. In Scotland the trial of a case by a judge alone is called a proof. See Evidence.

Proof. In engraving and etching, an early impression on paper, or print from the plate or stone or wood block. Trial proofs are those printed by the engraver for his own use, as a test of the work. Artists' proofs, which come next, are signed by the artist or the engraver or both. There are also proofs before letters, i.e. before the letters of the title or other inscription have been added. In printing and photography, a proof is a test print submitted to the client for approval. See Print.

Proof Correction. Term for the work involved in reading and correcting or altering a proof or impression of printed matter before it is cast or otherwise made ready in a technical sense for the press or printing machine. Every printing office has a dept. for this work staffed by "printers' readers."

Every author who wishes to see his work accurately produced should make himself familiar with the practical side of proof correction. The corrections are made in the margin of a proof by means of such marks as those shown in the accompanying illus. Consult Authors' and Printers' Dictionary, F. H. Collins, 9th ed. 1946; Rules for Compositors and Readers, H. Hart, 33rd ed. 1946.

Proof Spirit. Alcohol defined in English law as "that which at the temperature of 51° F. weighs exactly 12/13 of an equal measure of distilled water." The term is derived from the old smuggling days when the strength of spirit seized by coastguards was roughly tested by pouring a little on gunpowder and lighting the spirit. If when the spirit had burned away the gunpowder ignited, the sample was "over-proof." When the amount of water present in the

Proof Spirit. Alcohol defined in English law as "that which at the temperature of 51° F. weighs exactly 12/13 of an equal measure of distilled water." The term is derived from the old smuggling days when the strength of spirit seized by coastguards was roughly tested by pouring a little on gunpowder and lighting the spirit. If when the spirit had burned away the gunpowder ignited, the sample was "over-proof." When the amount of present water in the spirit was sufficient to make the gunpowder too damp to fire, the sample was "under-proof."

English proof spirit contains 49.3 p.c. by wt. or 57.1 p.c. by vol. of absolute alcohol; but U.S. is weaker at 50 p.c. by vol.

Propaganda. Name given to one of the great Roman congregations of cardinals charged with the administration of the various departments of the government of the Church. The *Congregatio de Propaganda Fide* has charge of all missionary operations of the Church. It was founded by Pope Gregory XIII in the 16th century. The *Propaganda* College is an institution at Rome for training missionaries.

Proof Correction. Examples of the principal marks used in correcting proofs for the press. The paragraphs as corrected appear in this page. Where a new paragraph is to be made the letters N.P. are written in the margin. Underlining a word with three short dashes indicates that it is to be set in capitals; for small capitals, two short dashes are made; or the letters may be simply underlined and the contractions caps and s.c. inserted in the margin

spirit was sufficient to make the gunpowder too damp to fire, the sample was "under-proof." English proof spirit contains 49.3 p.c. by wt. or 57.1 p.c. by vol. of absolute alcohol; but U.S. proof spirit is weaker at 50 p.c. by vol.

Propaganda. Name given to one of the great Roman congregations of cardinals charged with the administration of the various departments of the government of the church. The *Congregatio de Propaganda Fide* has charge of all missionary operations of the church. It was founded by Pope Gregory XIII in the 16th century. The Propaganda College is an institution at Rome for training missionaries.

Propaganda. The art and science of convincing others of the value of an idea, particularly a political or religious belief. The word is derived from a Vatican institution (v.s.). In politics it uses slogans and symbols, books and pamphlets designed to a definite end, flags and songs, and, above all, martyrs for a cause or an idea. From Galileo and Bruno to Edith Cavell and Matteotti, all who suffered for their beliefs

helped to make those beliefs more acceptable. The exploitation of press and films during the First Great War, and of press, films, and radio during the Second, all contributed to victory. In the First Great War the impressive organization established at Crewe House under the direction of Lord Northcliffe made a great contribution to the disruption of the Hapsburg empire by strengthening the claims of its heterogeneous nationalities to self-government. In the Second Great War almost all the belligerent powers established ministries of information, which performed similar functions.

However, propaganda is not necessarily a mere activity of wartime. The spreading of the culture of one nation does not necessarily involve the elimination of that of others; the ends of bodies like the Alliance Française or the British Council do not exclude each other, although they may tend to compete. Such activities, utilising cartoons and caricatures, plays, lectures, etc., may be used either to produce sympathy with, or antipathy against, an idea or a nation.

The study of propaganda is a branch of psychology, particularly mass psychology. The first to treat it systematically was the Frenchman, Gustave Le Bon, with his *Psychologie des Foules* (1895), and a more intensive treatment was given by W. F. Trotter in his *Instincts of the Herd in Peace and War* (1916). E. Stern-Rubarth, in *Propaganda as a Political Instrument* (1921), dealt more fully with its purely political aspects, and various psychologists in the U.S.A., e.g. F. Schoenemann, Quincey Wright, elaborated it still further. Totalitarian regimes in the 20th century used this knowledge ruthlessly, backing it with force. More democratic bodies, using propaganda as a means of peaceful penetration, sometimes succeeded in gaining recognition for positive ideas of value. The development and widespread use of propaganda has had a considerable sociological influence upon art and technique, on style and even language; and upon the handling of public affairs, in which the propagandist is often disguised as a Public Relations Officer (*q.v.*).

Propagation (Lat. *propagare*, to set slips). Horticultural term for the art of increasing or reproducing stocks of plants. There are various methods of propagation, e.g. seeding, cuttings, budding, grafting, layering, etc., described under their respective headings. Bulbs are propagated by seed, and also by bulbets, or offshoots, young bulbs attached to the side of the parent. Propagation of plants generally, on a large scale, for the public markets is now carried on by a process of rapid forcing, and the employment of bottom heat for the purpose. *See* Budding; Gardening; Grafting; Market Gardening.

Propellant. Material used in fire-arms to impart motion to the projectile. Whilst a propellant is popularly regarded as an explosive, there is actually a marked difference between them, the object of the latter being to cause a disruptive effect, while a propellant is required to exert a high pressure of a fairly constant character over an appreciable interval of time. The essential difference between the deflagration of a propellant and the detonation of an explosive is that in the former case decomposition begins on the outside of the grains, and proceeds through the mass by the consecutive combustion of parallel layers and at a slower rate than the velocity of detonation of a high explosive.

It follows that with a propellant the speed of decomposition can be varied by altering the shape or physical form of the material.

Vieille, the French scientist, made exhaustive researches on this subject, which culminated in his invention of *poudre B*. He came to the conclusion that to obtain regular results it was essential that the propellant be in the form of a colloid. With a propellant of this nature he was able to establish (1) that the grains of colloidal powders retain their original shape, but merely diminish in size, until completely consumed, and (2) that the rate of combustion varies directly as the pressure. All modern propellants have a nitrocellulose base, this compound being gelatinised by the use of a suitable solvent. British powders contain nitroglycerine in addition to the nitrocellulose. *See* Ammunition; Collodion; Cotton; Cordite; Explosives; Gunpowder; Lyddite; Pyrocollodion.

Propeller (Lat. *pro.*, forward; *pellere*, to push). Alternative name for device to propel a ship or aircraft. The marine propeller is dealt with under *Screw*; the aeronautical propeller under *Air-screw*.

Proper Motion. In astronomy, the angular rate of change in the position of a star in the sky caused by that part of its own motion through space which is transverse to the line of sight (*see* Radial Velocity). The so-called fixed stars are in fact moving at speeds up to about 100 m. a sec., but owing to their enormous distances the resulting proper motions rarely exceed a second of arc a year, and the shapes of the constellations have changed but little since the dawn of history.

Propertius, SEXTUS (c. 49-16 B.C.). Roman elegiac poet. He was born at Asisium (Assisi) and was educated and made his home in Rome, where he won the patronage of Maecenas and Augustus, and was a friend of Virgil and Ovid. Propertius belongs to the circle of poets who, like Keats, Byron, and Shelley, matured early and died young, his elegies revealing a rich vein of original genius and many passages of deep passion. The majority of his earlier poems deal with the relations of the poet with his mistress "Cynthia," whose real name was Hostia, but the subjects of the last book are chiefly drawn from Roman legend and history. There is a translation by Prof. Butler in the Loeb Classical Library, 1912.

Property (Lat. *proprius*, one's own). In law, the same as ownership. It does not mean, as it does in popular language, the thing owned. Indeed many people may have property in the same thing. Thus a person to whom an article is let on hire has a limited property in it, though the absolute ownership remains in the person who lets it. Property, or ownership, is, in law, a bundle of rights, indefinite, but not unlimited in extent; and, except in cases of limited ownership, of unlimited duration. They include the right of disposal in all its forms.

Property Tax. Another name for income tax, particularly the tax on income arising from land.

Prophecy (Gr. *prophēteia*). The term generally used in English to denote "prediction," or the power to foretell the future. This interpretation however, lays stress upon what was only an insignificant part of the work of the prophet. There are two words for prophet in Hebrew—*nābi* and *ro'eh*—and neither of them implies the power of prediction; the former meaning "he who announces," and the latter "the seer." In classical Greek, too, the term "prophet" signifies "the interpreter" rather than "the foreteller." Originally, therefore, prophecy signified the act of interpreting the will of God to men—and that was the supreme function of the prophets of the O.T.

"It is of the very essence of prophecy," says Canon Driver, "to address itself to the needs of the prophet's own age; it was the prophet's office to preach to his own contemporaries, to announce to them the judgements or the consolations which arose out of the circumstances of his own time." It is an entirely false conception of prophecy to regard it, as Bishop Butler does, as "nothing but the history of events before they come to pass." There are elements of prediction in all prophecy, but they do not constitute its essence, and sometimes the predictions were not fulfilled. The essence of prophecy lies in its moral and religious teaching, i.e. in its revelation of the purpose and will of God. *See* Inspiration.

Prophylaxis (Gr. *prophylax*, advanced guard). Term applied to measures taken for preventing a disease. *See* Public Health.

Propionic Acid, OR METHYL-ACETIC ACID. Acid produced during certain fermentation processes, and also in the destructive distillation of wood. It may be made by oxidising propyl alcohol with

potassium dichromate and sulphuric acid. Its salts are called propionates.

Proportion. In mathematics, an equality of ratios. As an example, the ratio 6 to 4 equals that of 24 to 16, and the statement as 6 is to 4, so is 24 to 16, is a statement of proportion. In general the proportion between four quantities, a, b, c, d , is written $a : b :: c : d$, a symbolism invented by the English mathematician William Oughtred (1575-1660). The theorem arising from the proportion is that the multiple of the first and last terms, ad , is equal to that of the intermediate terms, bc . If one quantity varies inversely as another, the two are said to be inversely proportional.

Proportional Representation. Method of conducting elections so that there shall be among those elected a proportional representation of all shades of opinion. Suppose an electorate of 200,000 persons votes to choose four representatives from among eight candidates, and the votes cast are: A, 70,000; B, 60,000; C, 25,000; D, 12,000; E, 9,000; F, 7,000; G, 6,000; H, 5,000. According to the method ordinarily used, A, B, C, D, E would be equally declared elected. As a result, (1) the votes of those who favoured F, G, and H would be ignored; (2) the votes of those who chose E would have nearly eight times the power of those who voted for A.

Those who advocate proportional representation propose that (a) constituencies should be large enough to return more than one member; (b) there should be a minimum number of votes, a quota, for election, calculated according to a formula; (c) voters should indicate their order of preference by writing on the ballot paper the figures 1, 2, 3, 4, 5, etc.; (d) those who gain the quota of first preferences should be declared elected, and their surplus votes credited to the unsuccessful candidates according to the second preferences; (e) the votes of the least successful candidates should be redistributed according to the second preferences shown with ballot papers in which they were first choice.

P.R. was adopted in the U.K. for some university constituencies, 1918-45, and for elections to the houses of laity and clergy of the Church of England. It applies in Eire, Tasmania, and to some extent in New South Wales, New Zealand, South Africa, Canada (for some municipal elections), and extensively on the Continent. It is

obviously most suitable when there are many parties of organized shades of opinion, and it leads naturally to coalitions. Some consider that where there is a fundamental difference of belief, P.R. may prevent governments from functioning effectively; but its advocates contend that in such circumstances it would merely prevent the majority from ignoring the views of the minority.

Propyl Alcohol, PROPANOL, OR ETHYL CARBINOL. One of the products of the fermentation of sugar. It is also found in the latter portions of the distillate obtained in rectifying crude spirits of wine, i.e. in fusel oil. Iso-propyl alcohol, isopropanol, or dimethyl carbinol is made from propylene and sulphuric acid; it is used as a solvent. Both substances have the same chemical formula, C_3H_7OH , the former boiling at $97.4^\circ C$. and the latter at $82.4^\circ C$.

Propylitisation, OR PROPYLITIC FACIES. In geology, a rock which has been permeated by thermal solutions of deep-seated origin, causing the abundant development of secondary chlorite, pyrite, and sometimes epidote, carbonates, and sericite. The original rock, often an andesite, basalt, or a rhyolite, assumes a dull green colour. The solutions responsible for this change are often associated with ore mineralisation; and its presence is therefore a useful guide in the search for mineral deposits.

Prorogation (Fr., from Lat. *prorogare*, to ask publicly, to defer). In parliamentary procedure, the interruption of a sitting of both houses by royal authority at the close of the session. It is a formal process by which parliament stands prorogued until a certain day, when, unless further prorogued, parliament meets. After prorogation all bills automatically expire, and must be introduced *de novo* in the following session. For this reason parliament has occasionally been prorogued for a single day in order to enable a bill to be introduced a second time, since no second bill of the same substance as a previous one may be introduced in the same session. See Parliament.

Proscenium (Gr. *pro*, before; *skēnē*, tent). In the theatre of ancient Greece, a wall with doors in it that hid the structure of the stage, and served as a background for the actors. In the modern theatre, that portion of the stage between the curtain or drop scene and the orchestra pit: though it

may include the curtain, which is sometimes attached to the proscenium arch.

Prose (Lat. *prorsus*, straight-forward). Direct language composed as the vehicle of thought intended to be spoken. It is thus one of the two principal forms into which literature (*q.v.*) is divided, the other being verse, language composed as an expression of thought primarily intended to be sung or chanted to musical accompaniment. The complete emancipation of prose from the laws of metre that are the subject matter of prosody thus furnishes the distinction between prose and verse. Rhythm (*q.v.*) is an integral part of good prose, but if it is to fulfil its primary function the first three essentials of prose are directness, lucidity, and appropriateness of the language it employs.

Prose as a studied literary form is preceded by poetry in the history of every literature. Another general truth is that classic Greece set a standard of excellence in every sub-division of prose as of poetry, upon which no later civilization has improved. Herodotus with the confident swing of his narrative, Thucydides with his chiselled periods polished to the nail, and Xenophon with his almost indolent facility, remain the types upon which all later historians have modelled their style. No detail of technique has been added to the art of oratory since the voice of Demosthenes was stilled. Plato remains the perfect master of prose applied to the expression of human thought in its widest range.

Of the few great Roman names that need be recalled here, Cicero stands out as the most versatile master of Latin prose, excelling as orator, as essayist, and as letter writer. Caesar's commentaries on the war in Gaul give hardly sufficient evidence of the qualities that must have informed works lost to us to justify the very high encomiums lavished on them by his contemporaries, but they are indisputably the work of a great writer, if not indisputably a great work. Sallust owed much to Thucydides; Livy introduced an intricate embroidery into the pattern of the language, which has a fascination that was not lost upon Macaulay eighteen hundred years later. Tacitus, whose style sometimes perilously approximates mannerism, closes the era of classic Latin prose.

Of the prose literatures of the modern world much is said in the articles scattered throughout this Encyclopedia. Perhaps the most

original, in the sense of not being derived from classic sources, is that of Iceland, where a purely native form of prose heroic narrative was developed in the 12th century. Even earlier than that England had a prose literature of her own, but this was based on Latin models, and it was not until the 16th century that the wonderful flower of English literature appeared in full perfection in the authorised translation of the Bible, especially the O.T. Thereafter the story must be followed elsewhere, through Donne, Cowley, Taylor, Temple, and Dryden, and through the romantic revival to the present day. In Germany, too, the Reformation brought in Luther's Bible the beginning of a vernacular prose literature. Elsewhere, in France and Italy and Spain, the story may be said to begin with the Renaissance; it is packed with great names, a few immortal. In all European countries the inheritance is rich. There is no indication, however, that, in any, trustees will fail to be forthcoming to preserve that which has been bequeathed, or lovers of literature to strive to increase the rich store for posterity.

Bibliography. English Prose, Sir H. Craik, 5 vols., 1893-96; On the Art of Writing, Sir A. Quiller-Couch, 1916; English Prose Style, H. Read, 1928.

Prosecution. A proceeding in a criminal court to put an accused person on trial. A prosecution usually begins by an information (i.e. a formal accusation) in a magistrates' court with the object of the accused either being tried summarily in that court or being committed for trial by a jury on indictment. A person may, however, be brought to trial by a jury without any preliminary proceedings or commitment by a magistrates' court for any offence on a bill of indictment being preferred by any person with the consent of a judge of the high court, or for murder, manslaughter, or infanticide on the inquisition of a coroner's jury, or for perjury on a bill of indictment being preferred by a judge or magistrate who considers that some person has committed perjury in proceedings before him. A prosecution may be begun in exceptional cases by an information filed in the king's bench division by the attorney-general.

Prosecutions are always in the name of the crown but they may be started by any private person of his own initiative, except where under various acts of parliament it is required that prosecutions must

be by order of a judge or by or with the consent of some official, e.g. the attorney-general, solicitor-general, or director of public prosecutions.

Proselyte (Gr. *pros*, to; *elthein*, to come). Term applied to a convert from one religion, opinion, or party to another. Originally it meant a Gentile convert to Jewish law and belief. Proselytes to Judaism were distinguished as proselytes of righteousness and proselytes of the gate. The first received circumcision and baptism; the second, also called sojourners, undertook to observe the precepts against idolatry, blasphemy, bloodshed, uncleanness, and the eating of flesh with its blood. Unless a proselyte was the son of a Jewess he could hold no public office nor become a member of the Sanhedrin.

Proskurov. Town of Ukraine S.S.R. It is a junction on the Odessa-Volochitsk rly, 55 m. N.E. of Kamenetz-Podolsk. In the district were remains of an old wall, called the Wall of Trajan, coins of whom have been found. Grain, fruit, and tobacco have been cultivated in the neighbourhood. Pop. est. 41,000.

Prosody (Gr. *prosodia*, relating to song). That part of grammar which treats of quantity, accent, and the laws of versification. See Verse.

Prosopopoeia (Gr. *prosopon*, person; *poiein*, to make). In rhetoric, a figure by which inanimate things or abstract conceptions are represented as animate beings with human attributes. Such personification is common in the poetry of all peoples. Another kind of prosopopoeia attributes probable but fictitious speech and action to historical persons.

Prospecting. Term for the search for mineral deposits. By the beginning of the 20th century most of the more obvious ore-bodies had already been found by old-time prospectors equipped with little except practical experience in the observation of the relationship between certain types of rock and ore, and the significance of gossans (see Secondary Enrichment), and in following traces of mineral in stream-beds upstream to their site of origin. Exhaustion of obvious sites of ore-bodies coupled with rising demand for ores led to the development of scientific prospecting based on applied geology.

Knowledge of local geology is facilitated by the study of geological maps; if these do not already exist reconnaissance traverses are made and the geologic

formations broadly outlined. More detailed work is then done in regions where the geologic conditions are favourable to mineralisation. Structural features of folding and faulting are closely inspected; the distribution of types of igneous rock is carefully noted, on account of the common association between such rocks and hypogene ore deposits (see under Ore Deposits). Limestones intruded by granite or granodiorite, introduced mineral of any kind, and rock alteration are closely examined for contact metamorphic (pyrometamorphic) ore deposits. Weathered areas, especially gossans, are studied for indications of the nature and grade of pre-existing sulphides. Scree, stream sands and gravels, glacial boulders, etc., are examined, and any minerals suggestive of mineralisation, whether valuable or not, are traced back to their source, often with satisfactory results, e.g. in Sweden, where copper-gold-bearing glacial boulders were followed towards glacial striae with success, and in Africa, where tin, gold, diamond, manganese, etc., have been found by panning and tracing the ore upstream.

Aerial surveys, like the old-time prospector's trip into the bush, can locate only surface outcroppings, or surface evidence indicating deeper mineralisation. Geophysical prospecting, however, makes it possible to locate certain types of ore bodies that lie hidden in the earth. Geophysical methods are magnetic; electrical; electromagnetic; gravitational; seismic; or depend on radioactivity. Magnetic bodies within the earth, e.g. magnetic iron ore, pyrrhotite, nickel, and cobalt ores, and rocks high in iron, such as basalt flows, that may contain copper, cause local deviations of the compass needle; variations in the magnetic susceptibility of the earth's crust can be measured with an instrument called a magnetometer.

Electrical methods are used chiefly for locating metallic deposits, but also in finding oil. determining geological structure, and in the logging of wells and bore-holes. Several methods are based on the low specific electrical resistance and electrical conductivity of metallic minerals. Variations in electrical resistivities of rocks at different places are measured; current is passed into the ground and potential differences are determined; or the natural currents caused by the rocks themselves may be used.

Electromagnetic methods are slower in operation than some of the others, but they are the most general since they give more precise information regarding shape and position of a hidden ore body. All make use of the fact that if a current be made to flow through a conductor an induced field is set up around the conductor. If another conductor (an ore body) lies within the induced field, it sets up a secondary induced field around it, which can be measured. Electromagnetic methods have been used in Sweden, Canada, and the U.S.A.

A plumb-bob normally points towards the centre of the earth, but a nearby mountain mass will cause it to be deflected from the vertical. A geologic body within the earth, heavier than its surroundings, will cause a similar deflection, depending on its size and distance from the plumb-bob. Lighter bodies appear to repel the bob. In this way, variations in density can be located and the presence of heavy ore-minerals or light oil may be indicated. The pendulum, torsion balance, and gravimeter are used in this method of prospecting.

Seismic Methods

Seismic methods are based on the fact that shock waves caused by an explosion in the earth's crust travel more quickly through some rocks than others, and are refracted (or bent) on passing from one type of rock to another. It is thus possible, by recording the arrival of shock-waves at different points, to build up a picture of the distribution of types of rock below the surface between the recording instruments and the dynamite charge used to set up the shock waves. Seismic methods have been used in prospecting for oil, gold and diamonds, ground water, etc., and in determining bed-rock formations.

Radioactive deposits are located by detecting the disintegration products of radioactive substances. The best known instrument for this is the Geiger-Muller counter. Minor methods of geophysical prospecting include one which depends on the fact that certain minerals fluoresce in ultra-violet light (see Fluorescence).

Geochemical methods of prospecting are chemical, biogeochemical, and geobotanical. The first two depend on principles laid down by V. M. Goldschmidt in 1933 concerning the distribution and natural history of the chemical elements. When rocks undergo

weathering and the rock minerals and ores break down, the elements may be dissolved by circulating ground water or absorbed on freshly precipitated iron and manganese hydroxides. Chemical prospecting involves the analysis of the trace elements in surface and ground water, in bog iron and manganese ores, in weathering deposits (especially laterites). Since plants take in the ground water solutions through their roots, and dissolved substances are concentrated in the plant at the places of maximum evaporation, the leaves, analysis of the ash of plant leaves indicates the metals in the ground water, and hence in the neighbouring rocks. The presence of a copper ore body, for example, may be indicated in a high copper content of leaves of plants growing in the vicinity. The geobotanical method depends on the fact that certain plants thrive on a soil rich in a certain metal. Geochemical are not so precise as geophysical methods, but they are useful where the latter are unsuitable, e.g. especially where the mineral occurs in thin veins.

Indications by one or more of these processes are further tested by pitting, trenching, and core-drilling before exploitation of deposits begins. *Consult* Applied Geophysics, A. S. Eve and D. A. Keys, 3rd. ed., 1938; Geophysical Exploration, C. A. Heiland, 1940; Exploration Geophysics, J. J. Jakowsky, 1940; Field and Mining Geology, J. D. Forrester, 1946.

John S. Webb

Prospectus. In commerce, document offering for subscription or purchase any shares or debentures of a company. It states the prospects of the undertaking for which money is required, and invites members of the public to furnish it. Usually appended to the prospectus is a form of application to be signed and sent with money by subscribers. Some prospectuses have contained misleading and false statements, and have made the most extravagant claims and promises in order to entice credulous investors to part with their money; but the company legislation of the 20th century, particularly the Companies Act, 1929 and the Companies Act, 1948, have imposed such stringent conditions that there is fairly complete protection against wilful deception, either positively by false statements or, what is equally important, negatively by omission of material facts. There is also

protection against gross misuse of money subscribed. The provisions of the Companies Acts concerning what must be stated in a prospectus are so comprehensive that the preparation is generally entrusted to specialists, either solicitors or experts employed by issuing houses. A company which does not issue a prospectus has to file with the Registrar of Companies a statement in lieu of prospectus, giving essential information similar to that which would have been available to the public had a prospectus been issued.

Prospero. Character in Shakespeare's play *The Tempest*. The victim of a plot by his brother Antonio, the usurping duke of Milan, and Alonso, king of Naples, he spends 12 years in exile on an island with his daughter Miranda. There he studies and masters the forces of nature; and, served by Ariel and Caliban, spirits of the air and earth, is able to practise magic. Raising a mimic storm, he lands his enemies on the island, and with them Alonso's son, Ferdinand, who, falling in love with Miranda, paves the way for a general reconciliation. In Prospero's final renunciation of his magic powers, many have found an analogy to Shakespeare himself. *The Tempest* being his last play. It is Prospero who delivers the famous lines: "We are such stuff as dreams are made on, and our little life is rounded with a sleep."

Prostate Gland. Organ which surrounds the neck of the bladder and first part of the urethra in the male. Somewhat resembling in shape a Spanish chestnut, it is about 1½ ins. across and contains a secretion which forms an important constituent of the spermatic fluid. Prostatitis, inflammation of the prostate, is often a result of gonorrhoea or of infection travelling down from teeth or tonsils. It spoils the chemistry of the prostatic fluid necessary to the health of spermatozoa, and is a frequent cause of sterility. In older men fibrous tissue in the prostate may block the flow of urine. The gland can be surgically removed and cancer of the prostate can be cured by injection of female hormone.

Prostitution. (Lat. *pro*, before; *statuere*, to place). Promiscuous sexual intercourse for the sake of gain. The women who practise it, usually for a livelihood, are known as prostitutes. Prostitution has existed in every country and in every age in history. In

Greece and Rome it was recognized and regulated, and the same was true of the countries of Europe, including England, during the Middle Ages. Today in the U.K. the law treats it as an offence against public order, but cases are extremely difficult to prove and it flourishes openly. In several countries prostitutes are registered, examined, and confined to certain areas. *See* Prostitution.

Protactinium. Radio-active element, symbol Pa, at. no. 91. Protactinium 231 has a half-life of 32,000 years, emits α - and β -rays, and decays to actinium. Isotopes are: protactinium 233, half-life 27.4 days; uranium X₂, 1.14 min.; uranium Z, 6.7 hours. The latter two are isomers of mass no. 234, in the radium series.

Protagoras (490-415 B.C.). Greek philosopher. Born at Abdera in Thrace, he taught in Sicily and at Athens, fleeing from the latter place after conviction on a charge of atheism brought against him for opinions expressed in a treatise on theology. He was drowned at sea. He was the author of a treatise which began with the famous sentence, "Man is the measure of all things." By this he meant that truth was relative, and that what each man holds to be true, that is true to him. The same principle also applied to morality, right and wrong being dependent on opinion. Protagoras was the first to study and write on grammar. He is one of the chief interlocutors in Plato's *Dialogue* which bears his name. *See* Sophists; *consult* Greek Thinkers, T. Gomperz, Eng. trans. L. Magnus, 1901-12.

Proteaceae. Family of trees and shrubs (a few perennial herbs). They are natives of the warm regions of the S. hemisphere. They have leathery leaves of varied form, from entire to much divided, in the different species. The flower parts are in fours, but the form, like that of the fruits, varies. There are nearly a thousand species. Some Australian species yield close-grained red or pink wood of considerable value to the cabinet-maker on account of its markings. Representative genera are *Banksia*, *Persea*, *Grevillea*, *Hakea*, and *Protea*.

Protecting Power. Neutral country which in time of war looks after the interests of one or other of the belligerents during the suspension of diplomatic relations. The protecting power has the right to inspect prisoner-of-war camps to see that nationals of the

country it represents are being treated properly. In the Second Great War Switzerland was protecting power in Germany and Italy for Great Britain and the U.S.A.; for the U.S.A. in Japan; for Germany, Italy, and Japan in the U.S.A.; for Germany in the N.E.I.; and for Japan in Hong Kong.

Protection. Political term applied primarily to the taxing of imports in order to increase their cost and thus to make it easier for home producers of such goods to compete with foreign suppliers. Protective taxes are wholly successful when they yield no revenue, that is, when they completely prevent the import of the taxed goods. They are, therefore, essentially different from taxes imposed on goods as a means of revenue. The opposite of protection is free trade, the condition in which, if goods are taxed, no distinction is made between goods from abroad and those produced at home.

Although the taxing of imports is the primary instrument of protection, there are many others: the total prohibition of imports, agreements between govts. to restrict the total quantity of goods to be imported (that is, the fixing of quotas), import licensing, govt. monopoly of foreign trade and bulk purchase, customs regulations concerning the valuation of imported goods, legislation concerning the nationality or the equipment of ships bringing imports, etc.

From the earliest times kings and other rulers issued decrees or signed treaties that assumed complete power to control imports and exports. In England there was much protectionist legislation before the end of the 14th century to protect retailers, to assist in establishing industries, and to foster merchant shipping. This policy was greatly extended during the Tudor period. Behind much of it lay the idea that it was desirable to export more than was imported, and to receive money (treasure) in order to balance trade. The balance of trade is still called unfavourable when imports exceed exports.

The policy of protecting industry against foreign competition developed excessively during the 17th and the 18th centuries, but the publication of Adam Smith's *Wealth of Nations* in 1776 turned men's ideas in the opposite direction. During the next 50 years the tariff system in the U.K. was simplified, most prohibitions on trade were abolished, and many duties were either removed or lowered

until in 1846 the Corn Laws were repealed, and the U.K. adopted virtually a free trade policy, and pursued it for more than 50 years. Towards the end of the century, however, the growing interest in the British empire and the decline of Great Britain's supremacy as a manufacturing country led to a demand for imperial preference, a form of protection intended to develop trade within the empire. In 1903 Joseph Chamberlain launched a campaign for tariff reform of a kind involving the abandonment of free trade. The First Great War revealed an almost total dependence on Germany for dyes and other chemicals, for optical glass and many kinds of scientific instruments. To foster home manufactures the Safeguarding of Industries Act, 1921, imposed duties on numerous articles produced by the so-called key industries. The Import Duties Act, 1932, created machinery for a general protective tariff, extended from time to time in many directions.

The U.S.A. is a large free trade area strongly protectionist in external trade; the U.S.S.R. is a large free trade area wholly protectionist in its external trade relations. Groups of countries within a customs union, e.g. Belgium, the Netherlands, and Luxemburg under the Benelux agreement, 1947, also constitute areas for internal free trade and external protection. *See* Corn Laws; Free Trade; Mercantile System; Navigation Acts; *consult* Industry and Trade, A. Marshall, 1919; Modern Tariff History, P. Ashley, 3rd ed., 1920; Tariffs: the Case Examined, W. H. Beveridge and others, 1931; International Trade and Tariffs, R. A. Hodgson, 1932.

Protection Order. In English law, an order that may be granted by a magistrate to a wife who has been deserted by her husband. Its effect is to protect any property she has, or may acquire, against her husband and his creditors, or any person claiming under him.

The term is also applied to an order that may be made by a court of summary jurisdiction when it is proposed to transfer to a new licensee a justice's licence for the sale of intoxicating liquor. The proposed transferee applies for the order, and if it is granted he is temporarily entitled to sell intoxicating liquor on the premises until the licence is transferred to him at the next transfer sessions.

Protective Colouring. Biological term for natural colour schemes which enable animals

liable to destruction by their enemies to escape observation when at rest, their colours harmonising with those of their natural surroundings. In consequence they merge into the environment and are invisible at a short distance. Several striking examples were known to the earlier naturalists and hunters, but they were regarded as exceptional. Among these were the striping of the tiger harmonising with the grasses of the jungle, the spotting of the leopard reproducing the shadows of leaves on sun-lighted ground, and the assimilative colouring of the upper parts of ground birds, such as woodcock and partridge, which rendered them invisible to birds of prey hovering far above.

So far, however, from being exceptional, such protective colouring is rather the rule for beasts, birds, reptiles, crustacea, insects, etc., whose mode of life requires it. Where the animal is inedible or has some offensive quality, as in the case of the skunk (*g.v.*), the coloration is of a character to render the animal highly conspicuous. As one general example, animals that feed on open sandy plains, such as the lion, camel, antelope, kangaroo, sand-grouse, and the lizards and snakes of such regions, are uniformly of a sandy tint in colour.

The generally accepted explanation is that these cryptic colours and patterns, originally due to the tendency to variation in all living things, have been reached through natural selection; the individuals who harmonise least with their environment being the most likely to fall a prey to their enemies. Protective coloration does not give immunity from attack to every individual; but it gives a chance to the most fit. *See* Animal; Bird: Colour; also col. plate to this article.

Protective Custody. Term invented to justify detention of a prisoner without trial on the grounds that it is for the prisoner's own benefit, either to save him from molestation or to save him from breaking the law. It was much used by the German Nazis in an attempt to excuse the incarceration in concentration camps of Jews and political prisoners or of any potential enemy. It has no place in English law.

Protector. In England a title bestowed on those, usually royal princes or leading noblemen, who acted as governors of the kingdom, when the king was a minor or otherwise incapacitated from ruling

Thus the dukes of Bedford and Gloucester were protectors during the minority of Henry VI, the duke of York in 1455 during Henry's illness, and the duke of Somerset during the minority of Edward VI. Such protectors were appointed by the privy council. Cromwell's title of lord protector of the Commonwealth was given him in 1653. *See* Cromwell; Regent.

Protectorate. Word used in two distinct senses: (1) the authority exercised by a protector or quasi-dictator, with particular reference in English history to the regimes of Oliver and Richard Cromwell; (2) more generally, the protectorship of the weak, especially of less advanced races by a stronger race, and, hence, the territory thus occupied. The term was in frequent use during the latter half of the 19th century, when large tracts of Africa and Asia came under European influence. Often a protectorate was followed by definite annexation.

A British protectorate is not part of the dominions but is within the British sphere of influence: its internal affairs are locally administered, but the British govt. exercises control over its foreign relations. The international status of protectorates was established by chapter 6 of the general Act of the African Conference held at Berlin in 1885. International law recognizes native subjects of a protected state as subjects of the protecting power. The principal British protectorates are Aden, Ashanti, Bechuanaland, Brunei, Nigeria, Nyasaland, Somaliland, Uganda, and Zanzibar. Some are administered in close association with a colony: thus the legislative council of Kenya has power to legislate for the Kenya protectorate. In Europe, the republic of San Marino was originally a protectorate of the Papal See and later of Italy, and Monaco a protectorate of France. *See* Colony; Mandated Territories.

Protein or **PROTEIN.** Complex organic compound containing carbon, hydrogen, oxygen, and nitrogen with a little sulphur. Proteins form an important part of all living organisms, and are the essential nitrogenous constituents of food. They are classified into (1) simple proteins, (2) conjugated proteins, and (3) products of protein hydrolysis. These include the albumen of white of egg, the globulin, fibrin, and albumen of blood, the ossein of bone, the gelatine and collagen of connective tissue, the casein of milk, and the creatin of meat. There are 50

proteins known to occur naturally in plants and animals. These all differ from one another in physical and chemical properties. *See* Albumin; Food and Nutrition; Gelatine; Haemoglobin.

Protein Plastics. Complex protein-containing materials of animal and vegetable origin, the most important of which are based on (a) casein and (b) soya bean. Casein plastics, which were first developed in the early years of the 20th century and are therefore among the pioneers of plastics, are based on casein, the main protein in cow's milk, in which it occurs as a calcium compound contributing 3 p.c. of the whole. Before 1940 the best casein came from France, but supplies are now mainly drawn from the Argentine, Australia, and New Zealand. Casein is separated from the milk by precipitation either with acid or by the addition of the rennet enzyme, rennin. Produced in this way, it is a translucent, yellowish powder. For the plastics it should not contain more than 2 p.c. fat.

The plastic is formed by mixing the dry powder and a dyestuff with water and plasticising agents, *e.g.* glycerine or methyl diphenylamine, and is then extruded through a screw press. The extruded mass is cut into small "nibs," which may be further mixed according to the colour required, and re-extruded or pressed into sheets in tray moulds of duralumin at 600 lb./sq. in. and 180–190°F. for 3 mins., followed by 2 tons/sq. in. for a further 3 mins. The sheets are cooled before removal from the press, after which they are hardened by immersion in formalin. The sheets and rod are then washed and dried.

Casein plastics are today mainly applied in the manufacture of buttons and colourful decorative trinkets. For manipulation casein plastics can be softened by immersion in water or heating in an oil bath at 80–100°C. or between hot platens at 85–90°C.

Casein plastics have a specific gravity of 1.33–1.45; ash content, 7–19 p.c.; water absorption after 48 hours' immersion at 72°F., 15 p.c. They are marketed in sheets 16 in. × 20 in., 2 mm. to 20 mm. thick, and rods 2 mm. to 20 mm. diameter, polished, unpolished, or trapped.

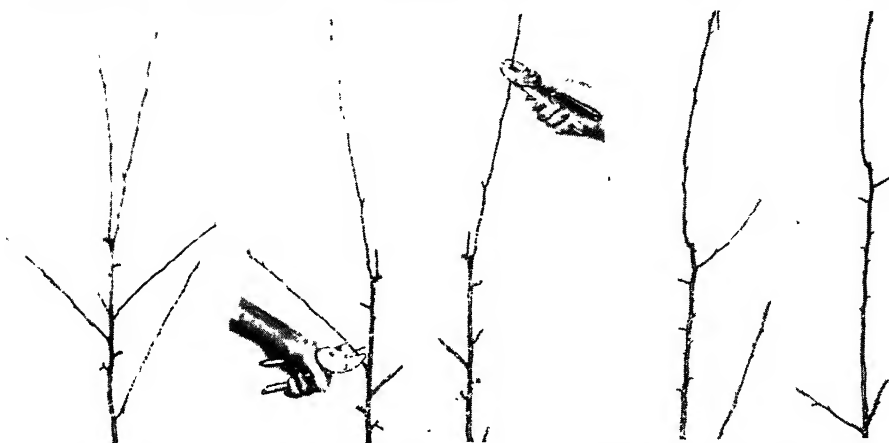
The potential importance of the soya bean as a raw material for plastics and oil led Henry Ford to spend considerable sums to establish its growth in the U.S.A. and in Essex. The beans are flaked,



1. Beetle (*Lithinus nigrocrustatus*) on a branch. 2. Spot insect (*Aerophylla chronos*). 3. Caterpillar of Spiny Moth (*Euclyptus artemisia*). 4. Red-winged Grasshopper (*Cedipoda* insect). 5. Leafhopper (*Acrida* insect). 6. Orange-tip Butterfly (*Delia* insect). 7. Homopterous Insect (*Umbra* insect). 8. Homopterous Insect (*Umbra* insect). 9. Lappet Moth (*Gastrophysa* insect).

10. Moth (*Umbra* insect). 11. Moth (*Umbra* insect). 12. Moth (*Umbra* insect). 13. Leafhopper (*Acrida* insect). 14. Leafhopper (*Acrida* insect). 15. Leafhopper (*Acrida* insect). 16. Leafhopper (*Acrida* insect). 17. Leafhopper (*Acrida* insect). 18. Leafhopper (*Acrida* insect).

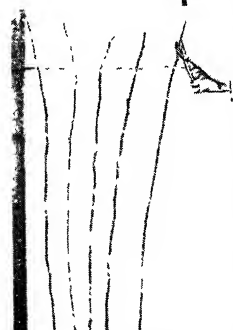
PROTECTIVE COLOURING IN ANIMAL BIRD AND INSECT LIFE



1 Apple branch before pruning. 2 and 3 Reducing laterals to 3 to 5 buds, and shortening leaders 4 and 5 Another apple branch showing two stages of pruning



Pruning a pear. 6 and 7 Shortening leaders and cutting laterals hard back to make fruiting spurs 8. Removing a shoot crossing main growths 9. Main leader A and false leader B to be shortened at lines C, D, natural spurs



15 Tipping raspberries in February

10. Bush rose before pruning and (11) with main stems cut hard back 12. Standard rose before pruning and (13) branches shortened to within 5 ins. of last season's cuts 14 Root-pruning a rose bush



and then extracted on the counter-current principle with a solvent, usually hexane, to yield soya meal which contains 48 p.c. protein (mainly casein), 32 p.c. carbohydrates, 7 p.c. cellulose, 7 p.c. ash. Whilst it is possible to produce from soya meal a plastic resembling standard casein plastic, it is more usual to use it as a modifier in a phenol formaldehyde composition. In much the same way plastics have been produced from coffee beans, but these are likely to be of interest only if the price of coffee fluctuates widely.

Protesilaus. In Greek mythology, first of the Greek leaders to be killed in the Trojan war. He was slain by either Aeneas or Hector, as he leapt from the ship to the shore. For the story of his wife's devotion, see Laodamia.

Protestant Alliance. Society founded in 1845 "to maintain the defence, against all the encroachments of Popery, of the Scriptural doctrines of the Reformation and the principles of Civil and Religious liberty, as the best security under God for the temporal and spiritual welfare of the British Empire." It issues a bi-monthly organ, *The Reformer*, and its offices are at 119, Earlsfield Road, Wandsworth, London, S.W.18.

Protestant Episcopal Church. Official and legal designation of the episcopal Church in America which is in communion with the see of Canterbury. It was introduced into Virginia in 1617, when the first English colonists arrived. In both Virginia and Maryland it was for a long period an established church. By the time of the revolution it had spread to most of the colonies, being still under the jurisdiction of the bishop of London and having no resident bishops.

In the 18th century urgent appeals were made to the bishops in England to consecrate a bishop for America. In 1783 Samuel Seabury, who had worked as a clergyman in New Brunswick and New Jersey, was chosen by the clergy of Connecticut to be their first bishop, and was sent to England for consecration. Political complications and supposed legal difficulties prevented the English bishops from acting; but on Nov. 14, 1784, Seabury was consecrated bishop at Longacre, Aberdeen, by Scottish bishops, with the knowledge and implicit consent of the archbishop of Canterbury. In 1787 the archbishop consecrated Samuel Provoost of New York and William White of Pennsylvania, in Lambeth Palace chapel.

The supreme governing body of the church is its triennial general convention, which has a presiding bishop at its head, and consists of a house of bishops and a house of deputies, composed of an equal number of clergy and laymen, elected by the several dioceses and missionary districts. Every diocese elects its own bishop, but his election has to be confirmed by a majority of the house of bishops and also of the standing committees of all the dioceses. There are 73 dioceses, 16 missionary districts at home, and 13 abroad. The overseas activities of the church extend to Cuba, the Dominican republic, Haiti, Puerto Rico, the Panama

Canal zone, Mexico, Brazil, the Philippines, Hawaii, China, Liberia, and the continent of Europe.

The original Prayer Book was considerably revised in 1789, 1892, and 1928. As to the ministry, the church holds to the threefold historical order of bishops, priests, and deacons. It has founded many important educational institutions. It claims over 1,500,000 communicants, as well as more than 2,000,000 baptized members. Since the practical cessation of immigration during decade 1930-40, the increase in the number of its communicants has been proportionately greater than that of the population of the U.S.A.

PROTESTANTISM AND ITS PRINCIPLES

Rev. P. Carnegie Simpson, D.D.

The reader of this article is also referred to that on Christianity and to those on the various branches of Protestantism, e.g. Church of England; Nonconformity; Presbyterianism, etc. See also Church; Reformation; also Calvin; Knox; Luther; and biographies of other reformers

The term Protestant had a definite historical origin. During the progress of the German Reformation a diet was held at Spire in 1526. At this diet the reforming party was in the ascendancy—the papal party being weak through the absence of the emperor Charles V and his open hostility both to France and to the pope—and it was agreed that each German state should be at liberty to settle its own form of religion. The result of this was to protect and establish the Lutheran Church in nearly all North Germany, where the princes favoured the reformed faith.

This settlement was never accepted by the Roman party or by the emperor; and the latter, as soon as he had concluded the French war and ceased to be in conflict with the pope, called a second diet at Spire in 1529. On this occasion the Roman party obtained a majority. The territorial arrangement, sanctioned by the former diet, was abolished, and instead enactments were made which continued the protection and endowment of the "old Church" in reformed Germany, while not tolerating Lutheranism in R.C. states. Against these decrees the minority of the diet—princes and representatives of cities—lodged a protest. This was not against any of the doctrines of the Roman Church. It was not theological, but legal and ethical. Legally, it *protested* against a unanimous agreement of one diet being reversed by a majority of another. Ethically, it asserted the principle that in matters of religion a

majority must not and cannot coerce the individual conscience. This is what historically and originally Protestantism is.

The word came rapidly into more general use to describe the system separated from the Roman Church. In this use it had first a positive and only later a merely negative meaning. When the Reformed Churches were described or described themselves as Protestant, that did not mean merely a denial of Roman beliefs; it was also an assertion of the faith held by these Churches. In this sense early Anglican divines used the term; thus even Laud disclaims any practices "to Popery or any way blemishing the true Protestant religion established in the Church of England."

Here the "true Protestant religion" is the full faith without either Roman accretion or any form of diminution. In the same sense the word is used in the English coronation service, where the sovereign swears to maintain "the laws of God, the true profession of the Gospel and the Protestant Reformed Religion established by law." But a narrower and negative use of the term inevitably grew up as non-Roman Christianity in the West developed various sects and sections, some of which had little positive church teaching, and the common feature of which was not their affirmations but their agreement in denying Romanism. Thus Protestantism gradually lost its original positive and evangelical character and became little more than an equiva-

lent for the denial of Roman Catholicism.

When we turn from the historical to the theological meaning of the term, it is important to note that beneath all the doctrinal antagonism, or divergence, which arose in the 16th century, there was still great fundamental agreement. The Reformers were careful to maintain their allegiance to the verities of the Catholic creeds, and on the Being of God and the Person of Christ, Lutherans and Calvinists did not disagree with the ancient council of Nicaea. Where Protestantism differed from the Roman Church was on matters subordinate to these primary articles of Christian faith. Into the details of this divergence—the opposing doctrines on such matters as sacraments, the Church, justification, and so on—it is impossible here to enter. It may suffice to indicate the two root principles which are the source of the separation.

Protestants and Romanists differ as to what is the rule of faith—i.e. the standard or authority of Christian truth and practice. Both sides admit the authority of the Christian Scriptures; but to Protestants this is supreme and sufficient, while to Romanists it may be added to by ecclesiastical tradition, and it is always to be accepted as interpreted by the Church. The Roman Church, therefore, does not admit an appeal to Scripture against authoritative Church doctrine or practice, whereas this is the appeal constantly made, or professedly made, by the Reformed Churches.

Here is the source of a number of the most conspicuous divergences between the two systems, in such matters, for example, as the number of the sacraments or the manner of their observance, and in many features of worship and of religious life. It should be added that the Protestant appeal to Scripture as the rule of faith does not—and in the early days of the Reformation did not—imply a rigid or literal view of Biblical inspiration and verbal inerrancy; the appeal was rather to the word, or utterance, of God which is to be found in the Bible. But Protestantism has often exaggerated the authority of the Biblical, as Romanism has that of the ecclesiastical, inspiration.

The other main source of divergence between the two systems goes deeper than any differences as to an external standard, and concerns the experience of religion. The Romanist system of religion is characteristically and essentially

sacramental and sacerdotal. Its sacraments are the sole authorised means of saving grace, and they are authorised to be such only



Proteus. Blind amphibian of subterranean waters showing the rudimentary limbs
W. S. Berridge, F.Z.S.

when administered by a validly qualified order of priests. Protestantism, however, took its rise out of a religious experience which did not depend on this. It found justification and all else that might be contained in salvation through the direct and personal relationship of the soul and Christ, unconditioned by the necessity of a sacramental and sacerdotal system. This did not imply that Protestantism denied or dispensed with either the sacraments or the ministry; but it did deny that only through these is the Christian salvation given. Thus the Protestant—or as the Reformed Churches would call it, the evangelical—experience of justification by faith led to an entire revision of the view of the relation of the individual soul to God and His grace, and to what was called “the universal priesthood of believers,” which means that God’s grace or salvation is immediately available through faith and not through the priesthood.

This was really the deepest dividing line at the Reformation; it had effects on the whole system of church doctrine and practice. It would be an exaggeration to say that here are two religions, but here are two irreconcilable ways of religion. Yet deep as are the differences between the Protestant and the Roman systems, they are not differences as to the source of religion. The aggregate number of persons accepting generally the Reformed principles may be reckoned at between 160,000,000 and 180,000,000.

Bibliography. History of Protestantism, J. A. Wylie, 1874; History of the Reformation and Modern Protestantism, C. T. Bettany, 1895; Principles of Protestantism, J. P. Lilley, 1898; Protestantism, W. R. Inge, 1935; Protestants, the Free Churches and the Future, R. S. Frayn, 1944.

Proteus (*Proteus anguinus*). Genus of amphibians, found in

subterranean waters in Dalmatia, Carinthia, and Carniola. It is eel-like in general appearance, 10 to 12 ins. in length, but has four small and rudimentary limbs, and retains external red gills throughout its life. The skin is smooth and flesh-coloured, and the eyes are beneath the skin. When the proteus is kept in captivity and exposed to the light, the skin tends to turn black. The animal is totally blind. *Pron.* Pro-tewss.

Proteus. In Greek mythology, a sea deity, son of Poseidon. He had the power to foretell the future but was always reluctant to exercise it. When consulted as to the future, he was in the habit of assuming different and sometimes terrifying shapes. Those who were bold enough to seize him and keep a hold throughout all his changes of form would eventually succeed in getting him to speak. Proteus was supposed to live in the island of Pharos, where he tended Poseidon’s flocks of sea-monsters. In the theatre, especially on the music-hall stage, a “Protean act” is the term for a performance in which one player assumes every part, appearing in different guises and assuming different characters in succession, with great rapidity.

Proteus. One of the two gentlemen of Verona in Shakespeare’s play of that name. His name typifies his changeableness, for when his friend is banished he woos that friend’s love, Silvia, forgetting his own absent Julia, only to return to Julia on her reappearance.

Proteuangelium Jacobi. Work ascribed to S. James, “the Lord’s brother” and first bishop of Jerusalem. Part of the N.T. Apocrypha, it contains 25 chapters, in which is given a legendary account of the birth of the Virgin and that of Christ. It shows traces of Ebionitic origin, and may have been based late in the 3rd century upon an earlier work. See Apocrypha.

Prothallus. The sexual (gametophyte) stage in the alternation of generations (*q.v.*) common to ferns, mosses, and many fungi and algae. The ordinary fern plant is an organism with diploid nuclei. When it is about to reproduce, meiosis occurs in the nuclei of certain cells of the sporangia which arise on its leaves, and as a result haploid spores are formed, later to be liberated. Each of these given suitable conditions will germinate to produce a thin plate of haploid chloroplastid containing cells fixed to the soil by numerous colourless hairs or rhizoids. This

is the fern prothallus. It is seldom more than about 1 cm. in diameter and never develops the complexities of stem, leaf, and root, or of tissues, which are found in its parent. Its only outstanding resemblance to that plant is that it is capable of self-nourishment.

In due course archegonia, each containing one egg cell, and antheridia, which liberate numerous motile male gametes or antherozoids, appear on the prothallus. The antherozoids fertilise the egg cells, and the diploid oospores so formed subsequently grow into ordinary fern plants deriving their nourishment at first from the prothalli, which on this account become exhausted and shrivel. The prothallus is thus the haploid gamete producing offspring of one diploid plant and the parent of another. In some pteridophytes two kinds of prothalli are formed, one female and the other male. In some the prothalli lack chlorophyll, depending on food passed on in the spore from the parent or derived from organic matter in the soil. In gymnosperms female prothalli constitute the main mass of the ovule; vestigial male prothalli occur as one or two cells in their pollen grains.

Prothero, SIR GEORGE WALTER (1848-1922). British historian.

Born Oct. 14, 1848, he was educated at Eton and King's College, Cambridge. He became in 1876 tutor and lecturer in history at King's College, London, and in 1894 professor of modern history at Edinburgh. There he stayed until 1899, when he succeeded his brother as editor of *The Quarterly Review*. He was one of the editors of the *Cambridge Modern History*, and for four years president of the Royal Historical Society. In 1918 he was appointed director of the historical section of the foreign office. Made K.B.E. in 1920, he died July 10, 1922. His brother was Lord Ernle (*q.v.*).

Protocol (Gr. *protos*, first; *kolla*, glue). Originally the first sheet of a papyrus roll. The *protocollum* of the Romans was a volume of papyrus leaves, bound together with glue, in which the senate's acts were recorded. The word later meant the original drafts of such acts, and ultimately came to refer to a fly-leaf, glued on to an MS. and containing the writer's name and a précis of the subject. In diplomatic language a protocol is the minutes of the sittings of a conference or congress which, although signed by the plenipotentiaries present, have the

validity only of a verbal engagement; also a document which, without having the authority of a treaty or convention, records the principles upon which an agreement has been reached; also an agreement between powers to proclaim an identity of views without binding such powers to common action (*see* Geneva Protocol). The *protocol diplomatique* is a collection of internationally recognized ceremonial rules to be observed in written and verbal intercourse between the heads of states or their ministers.

Protocols of the Elders of Zion. Documents alleged to be the minutes of a secret Zionist congress held at Basel in 1897. They described alleged secret Jewish ritual, including the sacrifice of Christian infants, and gave details of a conspiracy to overthrow Christian civilization and replace it by a Zionist world state. First published in 1905 by the anti-Semites of tsarist Russia, they became the basis for anti-Semitic campaigns in many countries. In 1921 *The Times* revealed that the protocols had been forged by a former member of the Russian secret police, who had founded them on a pamphlet by a French lawyer, Maurice Joly. Although proved a forgery, the protocols were adopted as a fundamental of the Nazi persecution of Jews. But in 1933 the Jewish communities in Switzerland secured a ruling from the high court that the protocols were a forgery and their publication constituted an offence against the penal code. *See* Anti-Semitism.

Protagoras. Greek painter of the 4th century B.C. Born at Caunus, in Caria, he worked at Rhodes, where he had a house just outside the city walls, and here he continued to paint tranquilly during the siege of the city by Demetrius Poliorcetes, 305-304 B.C. His imperturbability delayed the capture of Rhodes, since the assailants refrained from attacking in that quarter, being reluctant to destroy the artist and his works. He painted a picture into which he introduced a partridge so life-like that some living partridges were deceived. *Pron.* Pro-toj-eneez.

Proton. Subatomic particle having a mass of 1.6725×10^{-24} gm, or approximately 1,836 times the mass of an electron, and a positive electric charge of 1.6020×10^{-19} coulomb, equal and opposite to the charge on an electron. The number of protons in the nucleus of an atom (the atomic number *Z*) is equal to

the number of electrons surrounding it, and determines the element. Moving protons constitute some forms of canal rays and cosmic rays.

Protophyta. Division of plant life. The term was adopted by some authorities to include the lowest forms of Algae and Fungi, which are now more generally considered as Thallophyta (*q.v.*).

Protoplasm (Gr. *protos*, first; *plasma*, thing moulded) Name given to the slimy translucent substance which constitutes the living material of all plants and animals. It has been defined as the physical basis of life. Chemical analysis of protoplasm shows that it contains large quantities of water, the amount varying in different organisms and in their different parts and also with their stage in development. A jelly fish consists almost entirely of water; man's body contains some 65 p.c. water in youth and health, somewhat less in age and disease; in resting seeds the percentage is only about 10. Apart from water the outstanding materials found by the analyst are proteins, the remainder being principally sugars, fats, and salts. To the unaided eye a mass of protoplasm would appear something like uncooked white of egg. Under the microscope it is seen to consist of numerous particles and a structureless matrix in which they are distributed. The particles are of various sizes. The smallest, usually too small for their shape to be discerned, often oscillate in the manner—Brownian movement—exhibited by all small particles suspended in a fluid. It may then be inferred that the matrix is a liquid. The larger particles are frequently globular. Which of them are liquid droplets and which rounded masses of solid it is sometimes impossible to determine; but some are undoubtedly globules of fat, others masses of protein. The matrix just as certainly contains much water.

Protoplasm has thus a superficial resemblance to an emulsion, but it differs from pure emulsions in that it is elastic and can be coagulated. The former characteristic becomes evident when plant cells are plasmolysed in a sufficiently strong sugar solution. Water is withdrawn from the cell vacuole by osmosis and as the protoplasm is thus relieved of the outward pressure of the sap it contracts into a rounded vesicle; it does not simply collapse as it would do were the decrease in size simply due to the pressure exerted upon it by the plasmolysing fluid.

Congulation may in some instances be brought about by treatment with dilute acids, and reversal of the process by subsequent removal of the acid condition. In both these features, and in its propensity for absorbing water by imbibition, just as a piece of gelatine will do, protoplasm shows close resemblance to jellies. Like them it can change its consistency, being readily fluid or relatively solid according to circumstances. Changes may also occur in the microscopical appearance of protoplasm. The larger particles sometimes appear polygonal as if by mutual pressure, or, especially when the protoplasm is under strain or is streaming, they may be elongated as if drawn into that form by forces acting upon them.

Viscosity of the Matrix

The intensity of the Brownian movement exhibited by the smallest particles is also variable. When for example, an amoeba is in motion by means of its pseudopodia many of the particles in its protoplasm vibrate and the amplitude of vibration is pronounced. When, however, the animal is still, few particles vibrate and those that do so move very little in any direction. This shows that the viscosity of the matrix is low when the animal as a whole is moving and greater when it is still. It is then about that of glycerine. Thus it is clear that although the matrix contains much water, it is not water alone. It probably contains sugars and salts in solution, but must have in it something else which imparts the higher viscosity and the elasticity of the protoplasm as a whole. One widely accepted view is that there is in the matrix one or more of the simpler proteins such as albumen. From analogy with other elastic colloids it would seem that some such material must be present in the form of ultramicroscopic molecular aggregates which, like match sticks in an inordinately piled heap, are criss-crossed to form a three-dimensional elastic net, but, being re-arrangeable, do not inhibit flow. Protoplasm is however intrinsically different from any other conglomeration of its known chemical constituents in its capacity for carrying out the various processes which constitute its life in a manner tending to result in self-perpetuation. It has, e.g., the power to modify unlike material into kinds suitable for incorporation into its own substance and so of forming new material of its own kind, of deriving energy for its

sundry activities by means of exothermic reactions within itself, of changing its activity in response to changes in its surroundings. What it is that gives protoplasm this intrinsic peculiarity has been much debated. One theory is that some one substance or collection of substances holds the vital potentialities and, on account of the preponderance of proteins in protoplasm, that it is among such that the ultimate living material will be found. A contrasting view suggests that no individual constituent of protoplasm is alive, but that life is the outcome of the association of a number of materials in a peculiarly organized system, a view that is supported by the similarity between the chemical components and the visible structure of samples of protoplasm derived from widely different sources. The colloidal nature of protoplasm alone would, by providing extensive interfaces in which adsorption could occur, facilitate many of the reactions which make up its metabolism.

Bibliography. Microscopic Foams and Protoplasm, O. Bütschli, Eng. trans. E. A. Minchin, 1894; The Cell, E. B. Wilson, 2nd ed. 1900; Protoplasm, its Definition, Chemistry, and Structure, G. Mann, 1906; The Cell, O. Hertwig, Eng. trans., M. Campbell, 1909; Protoplasm, W. Seifriz, 1936.

Comyns J. A. Berkeley

Protopterus annectens. Species of lung-fish. It is found only in the rivers of tropical Africa, it resembles a bulky eel, and may attain a length of 6 ft. The swimming bladder is modified to serve the purpose of a lung, so that the animal is able to live for long periods out of water. When the streams dry up in the summer, the protopterus buries itself in the mud, where it forms a kind of cocoon, and remains dormant until the wet season. It seems to be nocturnal in habit, and creeps over the mud in shallow water by the aid of its limb-like fins. In the breeding season the male constructs a hole in the edge of a swamp, and when the eggs are deposited by the female, he watches over them till they hatch. By constantly waving his tail over them he causes currents in the water, and ensures their sufficient aeration. In the early stages, the young of the protopterus are very much like the tadpoles of a newt.

Prototheria (Gr. *protos*, first; *thērion*, wild beast). Lowest division of the zoological class Mammalia. It includes only *Ornithorhynchus* and the two spiny ant-eaters, all of which are restricted to Australasia

and New Guinea. These animals lay eggs and have only one external excretory, anal, and reproductive aperture. See Animal; Mammal.

Prototype. In engineering, the first full-scale model of a new type of a product, tested before going into production. Aircraft prototypes are subjected to tests in all flying conditions. Defects are made good before the factories are equipped to build large numbers of of the type.

Protozoa (Gr. *protos*, first; *zoon*, animal). Zoological term for the sub-kingdom of animals not divided up into cells. Members of this group are in general small, but the largest of them is larger than the smallest of the animals which are divided up into cells (Metazoa, *q.v.*). It seems likely that, as the name suggests, non-cellular animals appeared on the earth before those which are divided into cells; but the naïve equation of the many-celled animals with colonies of protozoa is probably too simple an explanation of the evolutionary process. It is probably better to think of a protozoön as being something like a house not divided into rooms, and of a metazoön as being something like a house divided into rooms, rather than to imagine a metazoön as being built up out of protozoa in the way a house is built up of bricks.

Similarly, it is important not to fall into the error of imagining that a protozoön is necessarily simpler than a metazoön. In many, although not all, protozoa the capacity to perform most of the varying functions of life seems to be distributed throughout the animal. In what we often refer to as "higher forms" the capacity to perform one bit or another of the process of life tends to be restricted to one part of the animal.

The protozoa properly so called are animals, not plants, though as a result of history some forms which are really plants are often wrongly included in the group. They need fairly complex substances in their environment available for them to capture and build into themselves. They are not in general surrounded by strong dead membranes through which material entering them must penetrate. This means that they can make use of larger molecules than are available to a plant. They may develop strong skeletal structures, but, if they do, these structures do not cut them off from the outside world.

The protozoa are extremely numerous. There are many kinds, and many individuals of some kinds. A small proportion of the protozoa in the world are pathogenic—a few very seriously so. The attention paid to these forms may lead to a false impression of their relative frequency in the group. The sub-kingdom is conveniently divided into two great groups, Plasmadroma and Ciliophora. The members of the former move by a number of devices, but never by ciliary action; the Ciliophora move by ciliary action, except for a few decadent varieties which for most of their lives hardly move at all.

In the Plasmadroma there are three classes. (1) The Mastigophora, among which are innumerable creatures all of which move by waving in various ways a whip-like (Gr. *mastix*, whip) structure or flagellum, in which waves travel from the animal to the tip. Some, e.g. the Trypanosomes, parasitic forms dwelling in the blood stream of many animals, have a membrane attaching the flagellum to their bodies. Most of these are harmless, but a few, probably those in process of rapid evolution which have not yet adapted themselves fully to their hosts, are deadly. They cause a number of very serious diseases in man and in his domestic animals. Dourine, a disease of horses, and the true sleeping sickness of Africa, as well as a number of other illnesses, are caused by members of this class.

(2) The Sarcodina, e.g. the amoeba, among which movement is by creeping. Some pathogenic forms exist, e.g. those responsible for amoebic dysentery. Here also are the foraminifera and the radiolaria whose skeletons, falling to the bottom of the ocean on the death of the animal, produce the great strata of chalk (foraminifera) and certain siliceous rocks (radiolaria).

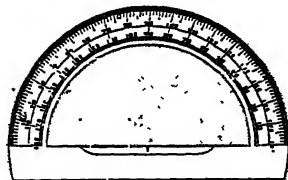
(3) The Sporozoa, which specialise in parasitism. Almost every member of the class is parasitic at some stage at least of its life history; and many are pathogenic, some seriously. One sub-group, the Coccidiorhiza (Gr., shaped like a barley-corn) includes forms responsible for the many coccidiosis affecting domestic animals, rabbits, chickens, pheasants, etc.; here also are the plasmodia which cause the many varieties of malaria.

Parasitic protozoa, like other parasites, have to get from host

to host. They frequently make use of what are called vectors, that is, some other animal related to their host in a particular way. For instance, the malaria parasite gets from man to man by way of a mosquito, which transfers the parasite by biting man and sucking his blood. This makes possible indirect attack upon the parasite by destruction of the vector. (If the mosquito had a point of view, of course, it would regard man as the vector and the mosquito as the primary host.)

In the Ciliophora there are comparatively few parasitic forms and those which are parasitic do, as a rule, comparatively little harm. They all exhibit ciliary locomotion—for instance in the orderly beating or rowing motion of very numerous hair-like structures reminiscent of eye-lashes. Some of them are attached to a substrate and use their cilia for creating currents in the water out of which they strain minute organisms for food.

All the protozoa carry on their vital activities in water, some in fresh water and some in the sea and some in the fluid of the blood of animals. Many of them are, however, capable of existing out of water, and within a protective coat, in a state of more or less completely suspended animation for long periods; in particular the Sporozoa form these thick protective coats and in the form of "spores" may blow about in the wind, or get eaten in food.



Protractor. Four varieties of this instrument. Top, boxwood metric; centre, semi-circular celluloid; bottom, left, draughtman's, and right, engineer's

REPRODUCTION. Throughout the group the nucleus (*q.v.*) periodically undergoes a process of reduplication which, though it is not possible in many cases to prove this cytologically, is almost certainly homologous with, or very closely analogous to, the process of mitosis (*q.v.*). Such nuclear reduplications almost certainly involve the reduplication of entities which can be called genes (*q.v.*). The resulting replicas of the original nucleus may remain in the original undivided cytoplasm, or each replication may be followed by a division of the cytoplasm. The former situation will give multinucleate forms and the latter numbers of separate individual animals. The process of nuclear division is sometimes called amitotic in those cases in which the phenomena of mitosis cannot be clearly demonstrated, and in which chromosomes (*q.v.*) are not obviously present. The distinction between mitotic and amitotic division seems more likely to be a distinction between forms that are understood and forms that are not than between methods of replication differing in their essential characteristics.

In many, though not in all, forms there is a process of syngamy (Gr., marrying together), which is the precise opposite of reproduction and involves the reduction by fusion of two individuals to one. It is tolerably certain that at least in some forms this is preceded by the reduction of the number of genes (whether grouped on chromosomes or not) to half by a process of meiosis (*q.v.*), and even in those forms where it cannot be demonstrated it is fairly safe to infer it. The process, as in other forms, results in a re-sorting of hereditary units and their recombination. It is therefore of great importance in evolution. Syngamy (*q.v.*) is often followed by renewed reproduction at an increased rate.

Consult Protozoology, C. M. Wenyon, 2 vols., 1926; The Biology of Protozoa, G. D. Calkin, 2nd ed., 1933; Animal Cytology and Evolution, M. J. D. White, 1945.

Paul 'Espinasse

Protractor (Lat. *pro*, before; *trahere*, to draw). Instrument for measuring and laying down angles. The simple protractor consists of a quadrant or semicircle of wood, metal, or some transparent material graduated along the arcuated edge into degrees. Straight-edge protractors are also used, the graduation lines

appearing drawn obliquely from the centre of one edge to points on the other edge. In marine surveying a three-arm protractor is used, the middle arm being fixed at the zero of a circular scale, the other two movable for measuring angles on either side. See Surveying.

Proud Flesh. Overgrowth of new tissue during an unhealthy condition of wounds or ulcers. It demands stimulating treatment, or treatment by X-ray.

Proudhon, PIERRE JOSEPH (1809-65). French political philosopher. He was born at Besançon,



Pierre Proudhon,
French philosopher

July 15, 1809, and worked for some years in a printer's office. In 1837 he published his *Essai de Grammaire Générale*, a philological study. In 1840 appeared his *Qu'est ce que la Propriété?*—a strong attack on the principle of property, which he declared to be theft. Subsequent works were *Avertissement aux Propriétaires*, 1842; *Création de l'Ordre dans l'Humanité*, 1843; and *Contradictions Économiques*, 1846. In 1848 he was elected to the Assembly, edited the *Représentant du Peuple*, and was imprisoned 1850. Prosecuted after publishing *De la Justice dans la Révolution et dans l'Église*, 1858, he lived in Belgium, 1858-63. A man of high personal character, he died at Passy, Jan. 19, 1865. Proudhon is important in socialist thought as a forerunner of Marx. He urged the ideal of service balancing service in society, and that the ultimate end of government was anarchy, i.e. that in the ideal society government would be unnecessary. His ideas were partly crystallised in the suggestion he put forward for a bank of exchange. The main principle of this was the issue of bank notes against produce handed into the bank. A bank on these lines, however, failed. His collected works were issued, 1867-70, and his correspondence, 1875. *Consult Lives*, C. A. Sainte-Beuve, 3rd ed. 1873, D. W. Brogan, 1934; *The Un-Marxian Socialist*, H. de Lubac, 1948.

Proust, JOSEPH LOUIS (1754-1826). French chemist. Born at Angers, Sept. 26, 1754, and educated as an apothecary, he became chief pharmacist at the Salpêtrière, Paris. Afterwards he went to Spain, where ultimately he became director of the royal laboratory at

Madrid, but was ruined by the Spanish war, the French on taking Madrid destroying his laboratory and collections.

He returned to France, 1806, later receiving a pension from Louis XVIII, was elected to the academy of science, 1816, and died at Angers, July 5, 1826. Proust discovered grapesugar, 1805, in various natural products, and was the first to prove that the elements combine in a small number of fixed proportions, Dalton afterwards establishing the law of multiple proportions.

Proust, MARCEL (1871-1922). French writer. Son of a professor at Paris university, he was born July 10, 1871, and educated at the Lycée Condorcet, Paris. Of delicate constitution, he became a leader of a group of intellectuals, and frequented fashionable salons of the day, publishing a collection of stories, *Les Plaisirs et les Jours*, in 1896. In 1902 his health began to fail, and he embarked upon a long and leisurely work in which was captured his whole experience of life—a re-living of the past, wherein he dwelt subtly upon every impression received—a process of development, change, and continual creation. A supreme artist, he made his characters live vividly in the minds of his readers. *Du Côté de chez Swann*, 1913, was the first of a series of novels published under the collective title of *À la Recherche du Temps Perdu*. The second of the series *À l'Ombre des Jeunes Filles en Fleur*, won the Goncourt prize in 1918. Next came *Le Côté de Guermantes*,



Marcel Proust,
French writer

1920; *Sodome et Gomorrhe*, 1921; *La Prisonnière*, 1922, and, posthumously, *Albertine Disparue* and *Le Temps Retrouvé*. With the exception of the last book (which was translated into English by S. Hudson) the complete series was translated by R. Scott-Moncrieff under the title *In Pursuit of Lost Time*. Proust died in Paris, Nov. 18, 1922.

His influence was considerable; his discursive manner, with its slow unfolding of detail, aroused

much discussion. Rich in thought and poetic in treatment, his writing was notable for its involuted style and delicate precision; his intention—brilliantly achieved—was a conquest of the past, and the term "creative time" was used to describe his masterly analyses of memory and motive. *Pron.* Proost.

Bibliography. Studies by J. Rivière, 1924; L. Pierre-Quint, 1925; P. Souday, 1927; C. Bell, 1927; S. Beckett, 1931; G. D. Lindner, 1943.

Proustite. In mineralogy, a sulphide of silver and arsenic ($3Ag_2S \cdot As_2S_3$), containing 65 p.c. of silver. A bright red colour giving it the alternative name of ruby silver ore, it is found in association with other silver minerals, galena, etc., in vein deposits. The mineral is named after Joseph Louis Proust.

Prout, FATHER. Pseudonym of the Irish humorist, Francis Sylvester Mahony (*q.v.*).

Prout, JOHN (1810-94). British agriculturist. Born Oct. 1, 1810, he took up farming in Canada, and, returning to England, settled at Sawbridgeworth in 1861. He established on scientific lines a farm, where he made valuable experiments in cereal raising on clay soils, publishing the results of his observations in *Profitable Clay Farming*, 1881. He died Dec. 7, 1894.

Prout, SAMUEL (1783-1852). British painter. Born at Plymouth, Sept. 17, 1783, he studied under John Britton, and settled in London in 1812. His earlier works were landscapes and coast scenes, but visits to the European continent in 1818 and 1824 stimulated his talent for picturesque architectural subjects. He died at Camberwell, Feb. 10, 1852.



Prout

Prout, WILLIAM (1785-1850). British chemist and physician. Born Jan. 15, 1785, at Horton, Gloucestershire, and educated at Edinburgh, where he took the degree of M.D., he turned his attention to chemistry. In 1815 he published his paper on atomic weights, in which he first announced that the atomic weights of all elements are exact multiples of that of hydrogen. Prout was the first to obtain urea in a pure form and, in 1823, to discover the existence of free hydrochloric acid in the stomach. Prout died April 9, 1850.

Provence. Province, one of those into which France was divided before the Revolution. It was a province of the Roman Empire, before the opening of the Christian era, and lay between the Rhône, the Alps, and the Mediterranean. Its capital was at first Aix, and then Arles, with Marseilles as another important city. Its boundaries were continually changing, and its close association with Burgundy has led to much confusion between the two. After the fall of the Roman Empire, the S. part of Provence was seized by the Visigoths, and in the 6th century the whole of it appears to have come under the rule of the Franks.

History after Charlemagne

It was transferred, either in whole or in part, from one king to another during the century which followed the death of Charlemagne, but before 900 it had been again united and formed into a kingdom for a certain Boso, brother-in-law of Charles the Bald. This was called the kingdom of Provence, or Burgundy, but it must not be confused with the other kingdom of Burgundy, away to the N. It had but a brief existence, and Provence was next included in the more N. Burgundy, which, in 1032, passed by bequest to the German king, Conrad II.

Before this time, as all over the Carolingian Empire, a number of counts had arisen in the district, one of whom soon made himself paramount. He was called the count, duke, or marquess of Arles, or sometimes of Provence. Early in the 12th century the heiress of this family, the real although not the nominal sovereign of Provence, married the count of Barcelona, to whose heir, Alphonso, king of Aragon, it passed about 60 years later. He and his son ruled it for some years, and then it went, again by marriage, to Charles of Anjou, king of Naples, who had trouble with the Provençal towns, then becoming rich and turbulent.

During the next two centuries, i.e. the period between 1250 and 1470, the country of Provence was disturbed and impoverished by warfare between its Angevin rulers and their many foes. In 1482 the last count bequeathed Provence to Louis XI of France, whose successor Charles VIII made good his authority therein against other claimants. Provence, whose overlord had been the German king, thus passed definitely to France. It retained certain special privileges, including an assembly of estates which endured until the 17th century, and it was never quite merged in the rest of France as

were other provinces. Provence now constitutes the departments of Bouches du Rhône, Var, Vaucluse, and Basses-Alpes. It is noted for its valuable Roman remains.

LANGUAGE AND LITERATURE. Provençal proper was originally the most important dialect of the broader Romance language known as the *langue d'oc*, which in the 12-14th centuries was the spoken tongue of S. France, Italy, and Spain. A highly developed literary language by the 12th century, its hold was weakened by the political developments of France and Provence and by contact with the *langue d'oïl*, and by the mid-14th century it was little more than a patois. Derived directly from Latin, Provençal bears a close general resemblance to the French language, but has important phonetic differences. With many local variations and French modifications, the dialect survives in S. France.

Provençal literature was rich both in quantity and in variety of form. The chivalrous romances of Provence, such as *Flor et Blancheflor* or *Gérard de Roussillon*, were overshadowed by those of the north, but in the lyric poetry of the troubadours it was unrivalled in its time. Among the principal forms were the *canzones* and *albas*, love songs, the *sirventes*, satiric songs, the *plants*, plaints, *prèzies*, war songs, *tensons*, dialogues, and *pastorelas*, shepherd songs. Prose works are few and of minor interest. The development of this great literature reached its climax during the 12th century and ended practically with the 13th.

The 19th Century Revival

A notable revival, however, in Provençal literature took place in the 19th century. Chiefly under the impulse of Joseph Roumanille and F. Mistral, the *Félibrige* was founded in 1854, with the object of preserving the vitality and purity of the language. Among other notable poets associated with the revival have been Jacques Jasmin, Théodore Aubanel, Jean Brunet, Paul Giera, Xavier de Ricard, Félix Gras, and Pierre Devoluy. The annual publication *Armana Prouvençau*, founded in 1854, reflects the main current of the movement and has reached a wide circulation in the Midi, and several Provençal periodicals appear in the principal towns. See France; Troubadour; *consult also* *Histoire de P.*, 4 vols., A. Fabre, 1833; Old P., T. A. Cook, 1905; P. and Languedoc, C. Headlam, 1912; Provence, F. M. Ford, 1933.

Proverb (Lat. *pro*; *verbum*, word). Short familiar sentence, an obvious truth or moral lesson. De-

scribed as the collective wisdom of mankind, or, by Cervantes, as "short sentences drawn from long experience," they are the most intimate folk-lore, for they embody, in simplest, pithiest terms, the homely knowledge of the common people, their everyday philosophy learned from experience of the ways of men and women and universal nature. Any clever man may make an aphorism, but no aphorism becomes a proverb, in the accepted sense of the word, until it has been tried by time, and obtained currency by general consent.

It is impossible to name the author of any proverb. Some obscure sage must first have formulated each one of them in words, but they seem rather to have emanated from the common consciousness and crystallised into phrases, much as seeds scattered by the wind put forth branch and leaf and open into flower before any man is aware of them. Certainly, the majority of proverbs were familiar in the mouths of the multitude long before they were written down. Many have found niches in the ancient literatures of Greece and Rome, of China, India, and Arabia. Each country, often each part of each country, has its own characteristic sayings, Spain, perhaps owing to Moorish influence, being very rich in them, but human nature and experience being essentially at one the world over, there is a marked affinity between them.

Frequently the same proverb, with colloquial variations, belongs to so many nations that none would venture to say in which country it was originally born, or whether it was spontaneously generated in all. "There's many a slip 'twixt the cup and the lip" is an old English proverb; but the French have one as old: "The soup is often lost between the hand and the mouth"; and in the 2nd century A.D. Gellius quoted "Many things happen betwixt the cup and the lip" as a Greek proverb matching a world-old Latin one. "It is too late to shut the door when the horse is stolen" has equivalents in France, Holland, Denmark, Italy, India, and Japan. Sterne is credited with "God tempers the wind to the shorn lamb," but a century earlier George Herbert included in his *Jacula Prudentium* "To a close-shorn sheep God gives wind to measure," and his was a collection of such wise saws, English and foreign, as were already popular.

Before Herbert, John Heywood, in 1546, compiled a book of English proverbs, and Ray followed his example in 1670. In 1855 a Hand-

book of Proverbs was added to Bohn's Library, and there has been a later collection by W. C. Hazlitt. The Scots have shown pious care in the preservation of their own proverbs. Since David Ferguson's in 1641, there have been four collections, in addition to one of Gaelic proverbs, by Macintosh, 1785, and another by Alexander Nicholson, 1882. Good French and Italian collections are *Livre des Proverbes Français*, 1859, and *Proverbi Veneti*, 1882. Spain, which is rich in proverbial lore, is adequately represented in Collins's Dictionary of Spanish Proverbs, 1822; and there are similar collections in Chinese, Japanese, Hindustani, Turkish, Persian, Arabic, as well as in Flemish, Russian, German, Dutch, and all other European languages.

Proverbs, Book of. One of the most important of the books of the O.T., belonging to a class of Hebrew writings called Wisdom Literature. The full title is "The Proverbs of Solomon, son of David, King of Israel." The book is a compilation of wise sayings and proverbs, and not, it would appear, the work of a single writer. Other authors besides Solomon are mentioned, such as Agur, the son of Jakeh (30, v. 1), and King Lemuel (31, v. 1). To a collection known as the Proverbs of Solomon were added presumably other collections of various dates and origins, but the fame of Solomon (*cf.* 1 Kings 4, v. 32), whose name became a symbol for wisdom, led to the retention of the original title for the whole compilation.

C. H. Joy describes the divisions of the book as follows: 1, a group of discourses on wisdom and wise conduct, chaps. 1-9; 2, a collection of aphorisms in couplet form, 10, v. 1-22, v. 16; 3, two collections of aphoristic quatrains, 22, v. 17-24, v. 22, and 24, vv. 23-34; 4, a collection of aphoristic couplets, 25-29; 5, a collection of discourses of various characters, 30-31. The philosophy and ethics of the book have much in common with those of the other products of the Wisdom Literature (Job, Ecclesiastics, Ecclesiastes, and Wisdom of Solomon). This suggests that the Book of Proverbs as a whole belongs to the post-exilic age. *See Bible.*

Providence. City of Rhode Island, U.S.A. It is the state capital, the second largest of the New England cities, and the co. seat of Providence co. A seaport, it stands at the head of navigation of Providence river, 45 m. S.W.

of Boston, and is served by the New York, New Haven and Hartford, and other rlys., and by ocean-going steamers. Prominent buildings are the state house, R.C. cathedral, Butler and Rhode Island hospitals, the Athenaeum, and a public library. The chief educational institution is Brown university, seventh oldest college



Providence, Rhode Island, U.S.A. The State House, opened in 1900

in the U.S.A. (1764), with fine buildings, several museums, and the Ladd Observatory, where the transit of Venus was observed in 1769. A large quantity of coal is shipped, and among the principal manufactures are jewelry, cotton, woollen and worsted goods, and machinery. South of the city is Roger Williams Park, with a statue of Williams, who first landed at What Cheer Rock. Pop. 253,504.

Providence was settled in 1636, on land which two years later the Indians conveyed to Williams by a formal deed. It was long a refuge for victims of religious persecution both in England and in the neighbouring Massachusetts Bay Colony. Its prosperity was built on commerce, and in 1832 it became a city. After the Civil War the basis was transformed to an industrial one, with textile mills prominent. Its original character has been drastically altered by twentieth century immigration.

EAST PROVIDENCE. This town, on Narragansett Bay and on the W. bank of the Blackstone or Seekonk river, faces the city of Providence, with which it is joined by bridge and has rly. communication. There are bleach works, paper mills, manufactures of wire, chemicals, and optical goods, petroleum refineries, and a baking powder industry. Oyster fisheries are valuable. Settled in 1636, East Providence was incorporated in 1862. Pop. 32,165.

Province (Lat. *provincia*, territory, etymology doubtful). Word specifically applied to the district round about Massilia (Marseilles), which, as Rome's first conquest outside the Italian peninsula, was known as the Province and is still called Provence. Successive conquests were formed into provinces for administrative purposes, Britain being one, and the term was subsequently used in a wider, more general sense. France before the Revolution was divided into provinces, which at an earlier date had been separate kingdoms or semi-independent territories. The dominion of Canada, too, is made up of federal provinces, and the term is also applied to

administrative divisions in several other countries of the world, *e.g.* the provinces of S. Africa.

For ecclesiastical purposes England is divided into two provinces, Canterbury and York, each being under the jurisdiction of an archbishop, and the term is also used in connexion with the Anglican Church overseas. Generally the provinces are contrasted with the metropolis of a country; *e.g.* in England there are London, the home counties, and the provinces. In a figurative sense, province means the proper sphere or function of a person or body of persons, *e.g.* "That is not within the province of the legislature."

Province Wellesley. Settlement of the Malayan Federation, formerly part of Penang in the crown colony of the Straits Settlements. It is a strip of territory along the W. coast of the Malay peninsula, bounded N. and E. by Kedah and S. by Perak, 31 m. long and averaging 11 m. in width, with an area of 290 sq. m. and a pop. of 171,587. Rice, pepper, spices, sugar, and tobacco are grown. Prai is the chief town and seaport. Province Wellesley, which became British in 1800, was captured by the Japanese on Dec. 17-18, 1941. *See Malaya, Federation of; Penang.*

Provincial Letters, THE. Familiar name of a series of 18 letters by Blaise Pascal, published under the pseudonym of Louis de Montalte, and supposed to be sent by a Parisian to a friend in the

provinces. The letters, published between Jan. 13, 1656, and March 24, 1657, embody an ironical attack on the Jesuits, rendered in singularly clear and powerful language. The standard English translation is that by T. McCrie, 1847. See Jansenism; Pascal; Port-Royal.

Provins. Town of France, in the dept. of Seine-et-Marne. It stands on the Voulzie, 59 m. S.E. of Paris. The 11th-century Romanesque Gothic church of S. Ayoul, the 12th-century Transitional church of S. Quiriace and its contiguous bell-tower, the Grosse Tour, the 13th-century church of Ste. Croix, and town hall are the main historic buildings. The town is noted for its rose culture. The Roman Pruvium, and a medieval industrial city, with a pop. of 80,000, it has declined since the Hundred Years War. Pop. 9,000.

Provision (Lat. *pro*, before; *videre*, to see). Legally, a provision is a clause in a will or deed, and in this sense it is used in constitutional history, e.g. the provisions of Oxford. The word is sometimes spelled proviso. Ecclesiastically, provision refers to an appointment by the pope to a benefice, but this question is more usually dealt with under the form provisor (*q.v.*).

Provisional Order. In the U.K., an order granted under statutory powers by certain government departments, authorising local undertakings of public usefulness, e.g. harbour and water works. Such orders are subsequently confirmed by statute. The Statutory Orders (Special Procedure) Act, 1945, introduced an alternative and more speedy procedure by which statutory powers might be obtained by various bodies to meet the special needs of reconstruction after war. See Bill; Parliament.

Provisions of Oxford. Plan for the better government of England formulated by the barons in 1258. In May the barons compelled Henry III to agree to the appointment of a committee of 24 persons to carry out certain reforms in the government necessitated by his extravagance. A parliament therefore met at Oxford to choose them, and Henry was allowed to nominate twelve.

The provisions drawn up by this body and accepted by the king provided for a standing council of fifteen members to advise and control the king, for another council of twelve to consult three times a year with the standing council,

and for a third council of 24 to make grants of money. All aliens were to be removed from office and expelled. The work of reform began with the appointment of new ministers and the flight of the aliens. The new constitution worked only until the end of 1259. By that time the barons were quarrelling amongst themselves, and in 1261 Henry, taking advantage of the position, obtained a papal bull releasing him from his obligation to observe the provisions.

Provisor. Literally, one who provides. In ecclesiastical language a provisor is one to whom the pope has granted the right of having the next vacancy in a benefice. The statutes of provisors were laws passed by the parliament of England in 1351 and 1390. The first recited a statute against papal aggression passed in 1307, declared invalid all ecclesiastical appointments secured by papal provision, and ordered the imprisonment of all who accepted such. The statute of 1390 made the penalties more severe. See Praemunire.

Provo. City of Utah, U.S.A., the co. seat of Utah co. It stands on the Provo river, 47 m. by rly. S.E. of Salt Lake City, and is served by the Denver and Rio Grande rly. A Mormon city, it is the seat of Brigham Young university, and has a Mormon tabernacle. Woollen goods, tin roofing, and flour are manufactured, a trade in lumber is carried on, and agriculture, stock raising, and fruit growing thrive in the vicinity. The city was named after Provot, who explored the valley in 1825, and in 1858 was a retreat of 30,000 Mormons. Civic rights date from 1851. Population 18,071.

Provost (Lat. *praepositus*, placed before). Chief municipal magistrate of a city or burgh in Scotland. The provosts of Edinburgh, Glasgow, Aberdeen, Perth, and Dundee are styled lord provosts. During office, the lord provost of Edinburgh is entitled to the prefix right honourable. The term is also applied to the heads of certain colleges, e.g. provost of Eton; King's College, Cambridge; Queen's College, Oxford. *Pron.* prov-ost.

Provost Marshal. Chief of military police in a camp or garrison town. An army officer, he is attached to headquarters, acting under the adjutant-general, and is responsible for maintaining order, arresting offenders against

regulations, and apprehending deserters. He keeps records of courts martial and carries out their sentences. In wartime a provost marshal is appointed to each army corps on active service, his police being responsible for collecting stragglers and, in conjunction with security police, preventing espionage. Where martial law is proclaimed, civilians have to carry passes signed by the provost marshal. Where there is no provost marshal, the military police are under a provost sergeant. The master-at-arms on board a warship where a court martial is in session is called a provost marshal. *Pron.* prov-o'. See Military Police.

Proxy (late Lat. *procuratia*, acting for another). Term used for a person who acts for another, and also for the authority by which he acts. It is chiefly used in the U.K. in connexion with voting. During the Second Great War Servicemen were permitted to vote by proxy at political elections; this was confirmed, and extended to certain other persons, by the Representation of the People Act, 1948. Company law allows the use of proxy votes, which may be either general or special. Proxies are also used in bankruptcy proceedings. Voting by proxy was allowed in the house of lords until 1868. Proxies are permitted in convocation and in the political conventions of the U.S.A. See Proctor; Vote.

Marriage by proxy cannot take place in England, though it is permitted in certain countries, particularly for members of the armed forces away from home in war-time.

Prudential Assurance Co. British insurance company. Established in 1848, its founders in 1854 undertook the insuring of members of the working classes for small sums, collecting the premiums weekly, this being then a new field. In the latter part of the 19th century the more ordinary life assurance business was much expanded, and in 1919 the company began to transact all classes of general insurance. The company has in force over 35,000,000 policies, invested funds to the amount of £500,000,000, and has paid claims of £870,000,000. It has agents in every town and almost every village of the U.K. and the head offices are at Holborn Bars, London, E.C.1

Prudentius (c. A.D. 348-410). Christian poet, whose full name was Aurelius Prudentius Clemens.

Born in Spain, probably at Saragossa, he practised as an advocate, held several provincial appointments, and lived for some time at the court of Honorius. Having lost the imperial favour, he retired to a monastery and wrote religious poems to stone for a misspent youth. His chief works, hexameters and lyrics, all the titles of which are in Greek, are *Cathermerinôn*, prayers for daily use; *Peristephanôn*, acts of martyrs; and *Hamartigenia*, the origin of evil. He was regarded as the outstanding poet of the early Latin Church.

Prudhoe. Village of Northumberland, England. It stands on the Tyne, 11 m. W. of Newcastle, with a station on the rly. to Hexham. Near are the ruins of Prudhoe Castle. Built by the Normans, this was defended against William the Lion in 1174, and later became the property of the Percys. The local industry is coal mining. Pop. 9,260.

Prudhoe Lând. Coastal tract of N.W. Greenland. It is situated N. of Hayes Peninsula, and is indented by Inglefield Gulf, which contains several small islands. It contains the settlement of Etah.

Prud'hon, PIERRE PAUL (1758-1823). French painter. Born at Cluny, April 4, 1758, of poor parents, he studied at the Dijon academy and in Italy. He returned to Paris in 1789, and after a hard struggle with poverty won reputation as an historical painter. His principal work was the decoration of the Louvre with ceiling paintings. He died in Paris, Feb. 16, 1823. See Marie Louise, illus.

Prune (Lat. *prunum*, a plum). Dried fruit of various plum trees grown in France, Portugal, other European countries, and America, especially in California. The plums are dried slowly and with much care, the best being sun-dried. They are eaten dry, or soaked and stewed, and are valuable for their laxative quality.

Prunella or **PRUNELLO.** Stout silk or worsted stuff formerly used for clergymen's and barristers' gowns. The word probably comes from French *prunelle* (sloe), in allusion to the colour of the cloth. The term was later applied to a doekskin twill.

Pruning (O.F. *proignier*). The process of cutting away superfluous stems, branches, and other wood from a tree, in order to induce healthy growth and increased productivity of flowers or fruit. Newly planted standard roses, shrubs, and fruit trees should

be pruned severely, to ensure the future shape and welfare of the tree or bush. If the scion has only two shoots, both should be cut back to a point as near to a bud as possible. This will result usually in the appearance of four healthy shoots the second year, and these in turn should be cut back to a bud, with the expectancy of the establishment of eight good branches in the third season. After that, pruning is at discretion, the chief objects being to keep the branches from crossing one another and to maintain the centre of the tree in a free and open condition. The actual cut should sever the stem at an angle of approximately 45°, and the operation is usually carried out with a pruning knife. Feb. and March are the best months. See illus. facing p. 6729.

Prunus. Genus of trees of the family Rosaceae. Natives of the N. temperate zone, many cultivated varieties yield valuable fruit, e.g. plum (*P. communis*), peach (*P. persica*), and cherry (*P. cerasus*). See Cherry; Cherry Laurel; Fruit; Peach; Plum.

Pruritus (Lat. *prurio*, itch). Another name for itch (*q.v.*).

Prussia. Geographical term which has been used for four distinct and, up to a point, different territories: (1) the lands of the once Slavonic and heathen Pruzzi (Prussians), roughly identical with the later prov. of East Prussia, but embracing areas, later Polish, on the E. bank of the lower Vistula; (2) from 1701 the new kingdom of the Hohenzollerns (former electors of Brandenburg), of which the older part, roughly between the river Elbe and the E. border of Pomerania, was part of the German empire; (3) the largest of the German states, 1866-1918, embracing the conquests under Bismarck's chancellorship and covering virtually all N. Germany from the French to the Russian border; (4) the remnants of that kingdom, from 1918 to 1945 a republic.

The "Prussian idea," as initiated by Frederick William (*q.v.*), the Great Elector, his grandson, the "corporal king" Frederick William I (*q.v.*), and Frederick the Great (*q.v.*), and enforced upon the whole of Germany by Bismarck (*q.v.*), is one of strict discipline, service to the state, and predominance, over all other citizens, of the ill paid, but glorified, military and next of the civil servants, most members of the higher ranks of both being drawn from the landed nobility,

the *Junker* class. This idea turned a comparatively poor and small land into one of the great powers, destroying the old Hapsburg empire, and replacing it by a new, smaller, but more powerful and efficient empire under the Hohenzollerns.

Prussia, at her greatest, from 1866 to 1918, extended across the central European plain about 700 m. from E.N.E. to W.S.W., and about 550 m. from the Danish border to the S. tip of Silesia, covering a total area of 136,000 sq. m. Of this area, 22,800 sq. m. were lost in 1919 under the treaty of Versailles (*q.v.*) to Poland, Denmark, Belgium, and Memel territory (later included in Lithuania), the Danzig free state, and, until 1935, to France (the Saar area). Pop. of Prussia, as it existed in 1935, was just over 40 millions, of whom 25 millions were Protestant, 12 million R.C., 420,000 Jews. It contained 33 towns and cities of more than 100,000 inhabitants; 41 p.c. of the working pop. was engaged in industry and crafts, 29.5 p.c. in agriculture, forestry, etc., 17 p.c. in trade and transport. Divided into 14 provs., one of which was the capital, Berlin, another the S. German dynastic area of the Hohenzollerns, Prussia's chief cities were, after Berlin and in order, Cologne, Breslau, Essen, Frankfurt-on-Main, Dortmund, Düsseldorf, Hanover, Duisburg, Wuppertal, Gelsenkirchen, Bochum, Magdeburg, Königsberg, Stettin, Kiel.

The chief rivers, flowing S.-N., were the Rhine, Weser, Elbe, Oder, and, until the loss of the Polish corridor and Danzig, the lower Vistula; Prussia included nearly the whole of Germany's coast line on the Baltic and the North sea, had an extensive network of canals (total nearly 1,000 m.), a number of lakes, many mineral springs and spas, and a considerable wealth of mineral deposits: coal in the Ruhr, Saar, and Silesian-Saxon areas, potassium and petroleum in Hanover, lignite in Saxony. Potatoes, rye, oats, some wheat, and sugar-beet were the principal agricultural products. Cattle-breeding, and in some provs. horse and pig rearing were important. Heavy industry was concentrated in Westphalia and the Rhineland, cotton in the Rhineland and Silesia, linen in Westphalia and Silesia, silk in the Rhineland, glass and ceramics in Saxony, Silesia, and the Rhineland, fishery

products along the Baltic coast. There was a large network for the distribution of electric power, from water and from coal and lignite. Prussia had a rly. system of 22,000 m., waterways serving inland ports (15 of which each had a turnover of more than a million tons a yr.) and a network of motor-roads completed in the 1930s. The balance between agriculture and industry thus developed was destroyed when the area E. of the Oder-Neisse rivers was placed under Polish administration in 1945, and most of its German inhabitants were expelled to the already overcrowded and most heavily war-damaged W.

HISTORY. The nucleus around which the later kingdom of Prussia arose was the march of Brandenburg (*q.v.*), conquered from Slavonic tribes by the emperor Otto I in the 10th century, and, as an electorate, transferred in 1415 to the wealthy burgrave of Nuremberg, Frederick of Hohenzollern. In the 13th century the order of the Teutonic knights had conquered the Pruzzi, and when in 1525 their territory was recognized as a secular duchy under the Polish crown, Joachim II, elector of Brandenburg (1535-71), was enfeoffed with it.

The First Kings

After becoming Protestant and gaining, by inheritance, the W. German duchies of Cleves and Juliers, 1614, and uniting Prussia with Brandenburg in 1618, Brandenburg-Prussia began to win recognition as a European power under Frederick William, the Great Elector (1620-88), who created a standing army, the first of its kind, and won victories over French and, especially, Swedish armies. After Frederick William's son and successor crowned himself king of Prussia at Königsberg, 1701, his kingdom successfully rivalled the imperial power at Vienna. Frederick William I (1688-1740) and his son Frederick II (1712-86), later dubbed the Great, completed the Prussian predominance in Germany. By alliance with Catherine the Great and the first partition of Poland the latter gained W. Prussia, linking his previously dispersed lands.

Frederick William II added enormous territories to his possessions for a short time; he was, however, defeated in a war against the new French republic. His son Frederick William III, defeated at Jena, 1806, lost his territory W. of the Elbe and all Polish territories except W. Prussia.

But after the wars of 1813-15, the new Prussia was established by the peace of Vienna, 1815.

This brought Prussia the N. half of Saxony, as a new prov., Danzig (previously a free city), Thorn, and the once Polish prov. of Posen (Poznan), the previously Swedish part of Pomerania with Rügen, and the bulk of the Rhineland and Westphalia. Rivalry with the Hapsburg dynasty for the domination of a future, reunited Reich, became the main political trend in Prussia.

When William I (*q.v.*) came to the throne, 1861, he appointed Bismarck (*q.v.*) his premier and inaugurated, 1862, what he himself called the "policy of blood and iron." He acquired the duchies of Schleswig-Holstein, 1864, from Denmark by war; challenged, 1866, Austria and defeated her, together with the W. and S. German states allied with her, annexing subsequently the kingdom of Hanover, the electorate of Hesse, the duchy of Nassau, and the free city of Frankfurt; thus linking the two parts of Prussia, and establishing, first, a N. German confederation under Prussia, and, at Versailles on Jan. 18, 1871, the new German empire under Prussian domination.

William I had established what was, in fact, a much enlarged Prussia. For the twenty-odd individual federal states theoretically forming a union of equals, among whom the king of Prussia—not emperor of Germany, but German emperor—officiated as hereditary chairman, were much weaker individually, and also in the aggregate, than was Prussia. And while the successful war of 1870-71 against France brought Alsace-Lorraine into the Reich as a part of the whole empire, the new acquisition was administered, taught, and garrisoned in the main by Prussians. Bismarck kept Prussia as a huge fortress within an empire. He increased the supremacy of the Prussian army and—the young navy being a Reich institution under the emperor—the fleet.

The personal ambition of William II (*q.v.*), backed by the natural expansionist trend of a rapidly growing industry and world trade, led to an application of Bismarckian methods in the sphere of world politics. This culminated in the First Great War and the defeat of Nov., 1918.

Within the Weimar republic, Prussia, while still numerically its main part, lost most of her

individuality and predominance, moral as well as material. The strong Socialist element was in general anti-federalist and emphasised the primacy of the Reich govt. and parliament.

When superseded by a *coup de main* under Papen's chancellorship in 1932, the Prussian govt. was united with that of the Reich, first by a personal union, Papen having himself appointed Reich commissar for Prussia; later, as soon as the Nazis took power, by making the Reich ministers simultaneously ministers for the corresponding depts. in Prussia, Goering acting as Prussian premier and appointing a council, the Staatsrat, as a substitute for parliament. The previous dualism under which Prussia was able to dominate the Reich in decisive matters was further curtailed by making the heads of the provs. directly dependent upon the Reich govt. and the Nazi party. Prussia thus ceased to possess a political personality of her own, and her history came to an end. The state of Prussia was officially abolished by the Allies, 1946. *See* East Prussia. *Consult* Twelve Books of Prussian History, L. von Ranke, 1930; Evolution of Prussia, J. A. R. Marriott and C. G. Robertson, rev. ed., 1937; Exit Prussia, E. Stern-Rubarth, 1940; Frederick the Great, G. P. Gooch, 1947.

E. Stern-Rubarth

Prussian Blue. Dark blue colouring matter, first made by Diesbach of Berlin in 1704, hence the name. It is a ferrocyanide of iron and an alkalic metal—sodium, potassium, or ammonium. The potassium compound is the best and is generally used. Ammonium blues, though better than the sodium, are not much used. The pigment is of very great staining power, one part in 1,000 of white lead giving a perceptible tint. It is frequently used reduced with blanc fixe or barytes, these grades being known as Brunswick blues. It can be produced in a variety of shades ranging from a greenish to a reddish tint. The highest grades having a fine bronze lustre are called Chinese blue. Prussian blue is fast to acids but very sensitive to alkalis. It is very transparent in oil and is therefore used in conjunction with other pigments and extenders. It is fast to light and can be used with most pigments, though pale tints made with white lead, zinc oxide, or chromes are apt to fade owing to chemical reaction. *See* Pigment.

Prussian Guard. Corps of the German army as it existed until 1918. Its nucleus was one of the regiments of guards maintained by the kings of Prussia. When the Prussian army was organized in the 19th century, these were formed into a corps of two divisions of infantry, each of four regiments and twelve battalions, in addition to cavalry and artillery, and a battalion of riflemen. It numbered about 40,000. This corps, regarded as one of special valour, secured the pick of the recruits and was called upon in times of special need, as at St. Privat, in Aug., 1870, and Ypres, in Nov., 1914.

Prussic Acid. Common name for hydrocyanic acid (*q.v.*). It was so called by Gayton de Morveau because the acid can be made by distilling Prussian blue.

Prut. River of the U.S.S.R. A left bank tributary of the Danube, it rises in the Carpathians, in territory which during 1919-39 was Polish; flows E. past Cernauti in Bukovina; and turning S.E., marks the boundary between Bessarabia and Rumanian Moldavia, falling into the Danube below Galatz. It is used for floating timber; boats can reach Jassy, 170 m. upstream on the Rumanian bank. Its length is 500 m.

One of the main thrusts of the German attack on Russia in 1941 was directed through Bessarabia towards Odessa and Rostov, but was temporarily held on the line of the Prut. German and Rumanian troops forced several crossings on July 2. On March 26, 1944, the 1st Ukrainian army reached the Prut on a 50-mile front, to capture Cernauti on March 30, and further crossings were made by the 2nd Ukrainian army in April.

Frynne, WILLIAM (1600-69). English Puritan. He was born at Swainswick, Somerset, and educated at Bath

g r a m m a r school and Oriel College, Oxford. Called to the bar in 1628, at Lincoln's Inn, he began writing polemical pamphlets, and in 1632

produced *Histriomastix*, an attack on stage plays and players, which violently offended the court. The author was prosecuted in the Star Chamber, fined £5,000, expelled from his university and Lincoln's Inn, pilloried, had both his ears

cut off, and was condemned to perpetual imprisonment. Although in prison, he managed in 1636 to get another pamphlet printed, which gained him a similar sentence, including the shearing off of the stumps of his ears and branding on the cheeks.

In 1640 the Long Parliament declared Frynne's sentence illegal, and voted him £4,000, though the award was never granted. He sat in parliament in 1648 for Newport, Cornwall, and after the Restoration became member for Bath, of which city he was made recorder in 1647. He was appointed keeper of the records in the Tower, and published some valuable historical materials. He died in Lincoln's Inn, Oct. 24, 1669. *Consult* W. P., a study in Puritanism, E. W. Kirby, 1931.

Przasnysz. Town of Poland. It is situated 59 m. N.E. of Plock and 55 m. N. of Warsaw, and is an important road centre. Early in the First Great War the town was the centre of heavy fighting between Germans and Russians, and changed hands several times. Its capture by the Russians in March, 1915, ended Hindenburg's offensive against the Narev, but it fell to the Germans later that year. In the Second Great War, Przasnysz was occupied by German forces after the fall of Warsaw, and after the partition of Poland remained in the German zone until taken by the Russians on Jan. 18, 1945.

Przemysl. A town of Poland, lying just W. of the Curzon Line, 60 m. by rly. W. of Lwow. Before the First Great War an Austrian fortress, designed to watch the passes across the E. Beskids, a section of the Carpathians to the S., it is situated on the San, which gives it easy lines of communication to the Vistula, Cracow, and Lwow. A hill S.W. of the town is crowned by ruins of a castle built by Casimir the Great.

In the First Great War, Russian forces advanced into Galicia in Sept., 1914, and after driving the Austrians from Lwow forced them into Przemysl, which was invested. The town was relieved by an Austro-German army, but a few weeks later was again besieged and held out until March 22, 1915. Following Mackensen's offensive in May, the Russians were driven back beyond the San and made Przemysl the pivot of their line. Mackensen, assaulting the town from both flanks, forced its evacuation on June 1. When the Germans invaded Poland in the Second Great War, Przemysl was captured

on Sept. 9, 1939, and at the partition of the country was included in the Soviet zone. After the German attack on Russia, it changed hands several times before being occupied by the Germans at the end of June, 1941. It was retaken by troops of the 1st Ukrainian Front on July 28, 1944. *Pron.* Pzhem-isl.

P.S.A. Abbreviation for Pleasant Sunday Afternoon. The movement for holding popular religious meetings under this name was started by John Blackham of West Bromwich in 1875 and soon took a firm hold in the midland counties of England. The meetings were chiefly organized in connexion with the Free Churches, especially the Congregationalists and Baptists, and the movement spread all over the country. Separate meetings were held for men and women, music was much in evidence, and addresses of a semi-religious or social character were delivered. In the 20th century the movement became merged in that known as the Brotherhood (*q.v.*).

Psalm (Gr. *psalmos*, a twanging of the strings of a harp.) Term for a sacred song accompanied by stringed instruments. The Psalter derives its name from the Gr. *psalterion*, a harp. *See* Psalms.

Psalmazar, GEORGE (c. 1679-1763). Name adopted by a literary impostor. He is believed to have been born in the S. of France and educated by the Jesuits, but nothing is known as to his real name. As a young man wandering about on the Continent in search of occupation, he stated that he was a native of Formosa. He was brought to England by an army chaplain, converted to Christianity, and sent to Oxford by zealous patrons, to continue his studies. He published in 1704 a Historical and Geographical Description of Formosa, partly taken from a Latin work and partly invented, with an elaborately fabricated grammar of the Formosan language. About 1712 he repented of his elaborate imposture, confessed it, and became a literary hack in London, later winning the esteem of Dr. Johnson by his piety. He died May 3, 1763. The following year was published his *Memoirs of—*, Commonly Known as George Psalmazar.

Psalmody. Practice of singing psalms and other spiritual songs. Although the character of the music used by the ancient Hebrews is not known with certainty, it is clear that singing formed an important part of their religious services. The practice persisted



William Frynne,
English Puritan

amongst the primitive Christians, who developed it in course of time. The Ambrosian Tones, first systematised in the 4th century, may possibly be traced to a Jewish origin; the Gregorian Tones, in the 6th century, mark a further development. There were three methods of singing the psalms and canticles: (a) responsorial, between a soloist and the choir; (b) antiphonal, between two choirs; (c) direct, sung full, without alternation. For the music to which the psalms were sung see Anglican Chant and Plainsong. See also Hymn; Psalter.

Psalms, Book of. Book of the Old Testament. It is a collection of 150 poems. The designation "Psalms" is derived, like the term Psalter, from the Septuagint. The Hebrew title is "Book of Praise-songs"; and in the Hebrew Bible this book is divided into five smaller books: (1) Ps. 1-41; (2) 42-72; (3) 73-89; (4) 90-106; and (5) 107-150. According to Jewish tradition the fivefold division was intended to correspond to the fivefold division of the Law, i.e. the Pentateuch. Each of the first four books closes with a doxology, and in the fifth book the last psalm seems to serve as such. In the Septuagint sometimes two psalms are united (9 and 10; 114 and 115), or one psalm is divided into two (116; 147).

In the Hebrew Bible and in the Septuagint, all but thirty-four bear titles or superscriptions which make statements about the authorship or occasion of composition, or give musical directions. These, like other O.T. superscriptions, are later additions, being due probably to post exilic editors. Psalms are here assigned to Moses (90): to David (in Bk. I all except 1, 2, 10, and 33; in Bk. II 51-65, 68-70; in Bk. III 86; in Bk. IV 101 and 103; in Bk. V 108-110, 122, 124, 131, 133, 138-145); to Solomon (72 and 127); to Asaph (50, 73-83), Heman the Ezrahite (88) and Ethan the Ezrahite (89), who are reputed to have been founders of the guilds of singers in the Second Temple; and to the Sons of Korah (42, 44-49, 84, 85, 87, and 88), gate-keepers of the Temple (cf. I Chron. ix, 19; xxvi, 1-19).

Thus, according to the tradition represented by the titles themselves, the Psalter is a collection of psalms of various authorship. It is also a collection of smaller groups. Other groupings are mentioned, such as the Psalms of Ascents (120-134), that is to say, probably pilgrim songs, sung on the way up to Jerusalem; and some others may be detected, such as Hallelujah-psalms (i.e. Praise-Jehovah

psalms; 111-113 and 146-150), Hallel-psalms (i.e. Praise - him psalms; 113-118), treated as a liturgical unit in Jewish literature, and Hodu-psalms (i.e. Give-thanks psalms; 105-107). The words "Of the Precentor" (or choir-master) with the musical directions in the superscriptions of many psalms suggest that, before the final collection was made, a large collection known as the Precentor's or Choir-master's Psalter was in use already. We learn further from the superscriptions that some of the psalms were sung to the melodies of old folk-songs such as "The Hind of the Morning" (22), "The Lilies" (45), and "The Dove of the Distant Terebinths" (56).

We know from the Second Book of Samuel (i, 17 ff., iii, 33 f.) that David composed funeral elegies, and from Amos vi, 5 that he was a famous musician. It is quite likely, therefore, that he composed religious songs or hymns. But it is felt by many scholars that many of the psalms ascribed to him by tradition reflect the circumstances and feelings of a much later age, some of them those of the Maccabean age. Even Theodore of Mopsuestia (b. c. A.D. 350) was driven to assume that seventeen of the Davidic psalms were "prophetic" of the Maccabean struggles. The expression Davidic Psalter, therefore, would be more correct than Psalter of David. A collection of psalms may have been called Davidic because David was the author of some of them, and was famous as a musician. The poems in the Book of Psalms are not all of equal value. By the side of much that is real poetry there is much that is more commonplace hymnology. But at their best the Psalms are gems of Hebrew religious poetry. See Bible.

M. A. Canney
Bibliography. The Psalms in Human Life, R. E. Prothero, 1903; The Book of Psalms, T. K. Cheyne, 1904; Critical and Exegetical Commentary on the Book of Psalms, G. A. and E. G. Briggs, 2 vols., 1906-07; Intro. to the Literature of the O.T., S. R. Driver, 9th ed. 1913; The Psalms, W. E. Barnes, 1931; W. O. E. Oesterley, 2 vols. 1940.

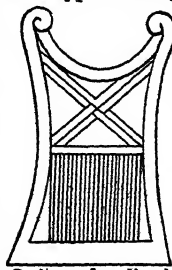
Psalms, PENITENTIAL. Seven of the O.T. Psalms (6, 32, 38, 51, 102, 130, 143), which have been grouped together because they all express the contrition and penitence of the sinner. In the Latin numeration the psalms are 6, 31, 37, 50, 101, 129, 142. Their recitation in Lent was ordered by Pope Innocent III, and Friday (with a few exceptions, such as Good Friday) was the day ordained by Pius V. In the Angli-

can Book of Common Prayer they are given (with the exception of 51) as the proper psalms for Ash Wednesday. Ps. 51 is assigned a separate place in the special Communion Service which is to be used on the first day of Lent (Ash Wednesday), but also at other times. See Miserere.

Psalter. Book containing the Psalms or other hymns, especially metrical paraphrases of the former, either with or without accompanying music. The practice of singing these paraphrases is anterior to the Reformation, but that event gave it fresh vigour in Germany, France, Switzerland, and England.

In England there appeared in 1549 a metrical version of the whole Book of Psalms by Robert Crowley, with accompanying music, and also in the same year a small volume containing nineteen versions by Thomas Sternhold. With the assistance of John Hopkins and other writers it was gradually enlarged in successive editions until in 1562 it embraced the whole of the Psalms, set to 65 different tunes, the melody alone being given. "Sternhold and Hopkins," as it is called, became the authorised version. Later versions, mostly doggerel, were those by Thomas Este, 1592; Thomas Ravenscroft, 1621; N. Tate and N. Brady, 1696. The singing of metrical paraphrases still persists in Scotland, but in England only a few of the finest specimens, such as "All people that on earth do dwell" (Ps. 100), are now used in worship. Consult Introduction to Historical Edition of Hymns Ancient and Modern, W. H. Frere, 1909.

Psaltéry (Gr. *psallérion*, a harp). Ancient string instrument of a type used by the Jews, the



Psaltéry of medieval design. From a 9th century MS.

or without a plectrum. It was so highly esteemed for its tone and purity as to be frequently introduced into pictures by medieval artists, from which source alone we gain an idea of its character, no specimen of a psaltéry being extant. The word as used in the A.V. of the Bible designates the Egyptian *nebel* or portable harp.

Psammetichus. Name of three Egyptian kings of the XXVth dynasty, a grecoised form of the Egyptian Psamtek. Psammetichus I (864-810 B.C.) secured the throne by favour of Ashurbanipal, but with Greek mercenary aid threw off the Assyrian yoke. The second king of this name reigned 594-589 B.C. With Psammetichus III, 525 B.C., whom Cambyses overthrew, the Egyptian empire ended.

Pseudomorphism (Gr., false shape). In geology, the development of a mineral or aggregate of minerals which have the outward crystalline shape of one but the chemical composition of another. These are known as pseudomorphs. This may be brought about first by substitution, a process of chemical replacement; and secondly by infiltration, when a cavity has been formed by the solution of one mineral which has left a mould of its shape behind, a second mineral or group of minerals having been deposited in the empty hole. Other processes are also known to occur. The new mineral is referred to as a pseudomorph after the original.

Pseudonym (Gr. *pseudes*, false; *nomos*, name). Fictitious name, especially one adopted by a writer, artist, or actor. It differs from alias, which is a false name assumed by a criminal to conceal identity. The pseudonym may be taken because it sounds well, but in the past had often a more practical reason for its existence. In journalism and pamphleteering, pseudonymity and anonymity have long been the custom. They gave greater security to the expression of opinion when libel law was less precisely defined than now; they prevented the influence of a periodical being diminished by the attribution of its corporate opinion to one perhaps prejudiced person. When Swift inveighed against debased coinage, he did so in letters signed M. B. Drapier. Junius (whose identity was never established) attacked the throne itself. The practice prevailed through the days of Historicus (Sir William Harcourt), up to the Second Great War, when party polemics were still conducted under Roman names like Cassius (Michael Foot).

In creative literature the pen-name may be due to several motives. Mary Ann Evans called herself George Eliot from a native modesty that was afraid of failure; the Brontë sisters submitted manuscripts in the names of Currer, Ellis, and Acton Bell because they

believed women's work would be rejected by publishers. William Sharp wrote as Fiona Macleod to give an air of reality to a second nature of which he was aware. Lewis Carroll was the Rev. C. L. Dodgson, a professor of mathematics, who may have thought the public would disapprove of light books bearing a scholar's name. Gen. Sir Ernest Swinton, otherwise Ole-Luk-Oie, is an example of the writer who makes contributions to knowledge under his own name and diverts himself under another. As a comment on the style of his work, G. R. Sims called himself Dagonet after the jester in the Arthurian legend. What may be called the occupational pseudonym explains Sapper (Cyril MacNeile), and in a sense Mark Twain, which was the call of the leadman on Mississippi steamboats heard by the young Samuel Clemens. H. W. Shaw wrote as Josh Billings perhaps to suggest the uneducated man whose language he affected.

Ashley Sterne was an anagram of Ernest Halsey. Initials come from shortening an awkward name, as in Q for Sir A. Quiller-Couch, or may themselves stand for a pseudonym, as in A. L. O. E., meaning A Lady of England (Charlotte Tucker); or mean nothing in particular, as in Y. Y. (Robert Lynd). Racing correspondents and contributors to the magazine features in newspapers and periodicals are given to the pseudonym. Often this survives its originator; several wits have been Beachcomber in the Daily Express. Broadcasting gave rise to a famous pseudonym in A. J. Alan, who was not discovered until after his death to have been L. H. Lambert. In this medium also different names may be used as the class of work varies, e.g. the Russian operatic singer Oda Slobodskaya broadcast light ballads as Odali Careno. An exceptional reason for adopting a pseudonym, the secret of which was long kept, was given by Sir Henry Wood, who composed occasional musical works as Paul Klenovsky in the belief that a Russian name would ensure a less critical reception than an English.

In addition to those already mentioned, other famous pseudonyms of writers and artists have included Bab (Sir W. S. Gilbert), George A. Birmingham (Canon J. O. Hannay), Boz (Charles Dickens), Caran d'Ache (Emmanuel Poiré), Carmen Sylva (Elizabeth, queen of Rumania), Elia (Charles Lamb), Fougasse (C. K. Bird), Anatole France

(Jacques Anatole Thibault), O. Henry (W. S. Porter), Edna Lyall (Ada Ellen Bayly), H. Seton Merriman (Hugh Stowell Scott), Molière (J. B. Poquelin), Ouida (Louise de la Ramée), Saki (H. H. Munro), Spy (Leslie Ward), Michael Angelo Titmarsh (W. M. Thackeray), Toby, M.P. (Sir Henry Lucy) Voltaire (François Marie Arouet), Artemus Ward (Charles F. Browne).

The adoption of stage names by actors is so common a practice that examples would be invidious. The reason seems to be a desire for a more distinctive name than the actor already possesses, though the practice may have originated in the low estimation in which the profession of acting was once held.

Psilomelane. Important ore mineral of manganese. Hydrated manganese oxide with varying amounts of barium and potassium, it occurs as black amorphous masses or in various stalactitic forms. Psilomelane is found in sedimentary or residual manganese deposits associated with other minerals, such as pyrolusite.

Psittacosis (Gr. *psittakos*, parrot). Disease caught by human beings from infected parrots and love birds. It is caused by a filtrable virus. The patient falls ill with what looks like influenza or typhoid, but the course of the disease does not fit either of those conditions. Diagnosis is confirmed by a specific blood reaction and rapid involvement of the lung. Treatment is by symptom. Though young patients usually recover, the overall mortality rate remains one in six. After an epidemic of psittacosis, an order prohibiting the importation of parrots into the U.K. was made May 20, 1930.

Psittacus (Gr. *psittakos*, parrot). Small genus of birds of the order Psittaciformes. It consists of the true parrots, natives mainly of Africa. As in all the family Psittacidae, the strongly arched and hooked upper mandible is hinged to the skull, giving the bill great mobility. The tongue is thick and fleshy; and two of the four toes are turned back and two forwards. The best known example of the genus is the grey parrot (*P. erithacus*) of equatorial Africa, whose powers of talking are remarkable. Its general colour is ashy-grey, but the primary wing-feathers are black, and the short tail is red. It is an admirable climber, flies in large flocks at a considerable height, and its wild note is a chattering scream. See Bird: Parrot.

Pskov or **Pleskov**. Town of the R.S.F.S.R. It stands on the Velikaja and the Leningrad-Warsaw rly., 170 m. S.S.W. of Leningrad, near the Estonian border. Its tanneries and leather factories are famous, and there is trade in timber, hemp, and flax. Founded in 965, Pskov was an independent state from 1348 until it was united to Russia in 1510. The old cathedral in the Kremlin, the cathedral of SS. Peter and Paul, and conventual churches are the chief historic buildings. Pop. 59,898.

In the First Great War the town was captured by the Germans in Feb., 1918, just before the Treaty of Brest-Litovsk. It was one of the first towns taken by the Germans when they advanced into Russia across the Estonian border in June, 1941. During the Russian offensive in the summer of 1944, it was an important stronghold of the German defences S. of lake Peipus, and its capture by assault by the Soviet 3rd Baltic army on July 23 eliminated a vital block on the Leningrad-Dvinsk railway.

Psoriasis (Gr. *psora*, scab). Inflammatory infection of the skin. It is characterised by patches covered with white or silvery-grey scales. The cause of this common affection is unknown, but hereditary influences often play a part. The disease is usually first manifested in childhood or adolescence. The lesion begins as a small, round papule, which soon becomes white as the scales form. Ultimately these develop into patches which may be several inches across. After attaining a certain size they often disappear spontaneously, fading first in the centre. The parts most frequently affected are the tips of the elbows and the fronts of the knees, and after these the scalp. Recurrence of the condition after it has disappeared is very common. In the early stages, arsenic and salicin administered internally have proved useful. For local treatment, hot baths, containing a teaspoonful of bicarbonate of soda to the gallon, are helpful. Chrysarobin is a helpful local application. *Pron.* so-ria-sis.

Psychasthenia. Disorder of the mind due to abnormal psychological processes. It is characterised by obsessions, the patient feeling compelled to perform useless and illogical acts in order to prevent some calamity happening, though he recognizes the absurdity of his conduct. Spasmodic movements of the muscles are another symptom. Some authorities use the term in a wider sense to include

neurotic disorders which appear to be mainly constitutional or inherited. *See* Mental Disorder; Neurasthenia; Neurosis. *Pron.* si-kas-theenya.

Psychē (Gr., soul). In classical mythology, a maiden so beautiful that she aroused the envy of Aphrodite, who sent Cupid to inspire her with love for the meanest of men. Cupid, however, fell in love with her beauty himself, but left her owing to the machinations of her jealous sisters. Psychē then set out to look for Cupid, and after long wandering was united to her lover and became immortal. The story of Psychē is beautifully told by Apuleius (*q.v.*). It is an allegorical representation of the human soul, which eventually finds complete happiness by purification through trouble and sorrow. *Pron.* Psi-kee. *See* Cupid.

Psychiatry (Gr. *psychē*, life, soul; *iátrōs*, physician). Medical treatment of the mind, particularly of mental disorder or weakness. It is concerned with describing the different forms of mental disturbance and classifying them in clinical pictures according to their symptoms, though, strictly speaking, it is not concerned with the origin, mechanism, or interrelation of the symptoms. Only when the disorder can be correlated with some demonstrable change in the brain, or can be identified as the secondary effect of organic disease, does psychiatry, within the exact sense of the word, play any primary part. It formulates a psychology of consciousness, concentrates on the anatomical, chemical, and physiological aspects of mental disease, and does nothing with the symptoms but define them as signs of a special kind of degeneration, or as due to constitutional inferiority or hereditary disposition. However, psychiatrists have in practice learnt to observe their patients in the light of psycho-analytic theory. *See* Mental Disorder; Psycho-Analysis. *Consult* Text-book of Psychiatry, D. K. Henderson and R. D. Gillespie, 1944.

Psychical Research. Term denoting the scientific study of the more obscure and unexplained activities of the human spirit (Gr. *psychē*), or of spirit in general. It became current about 1882, when the society for psychical research was founded by Henry Sidgwick, F. W. H. Myers, E. Gurney, and others for the serious study of thought transference, apparitions and haunted houses, hypnotism, trances, clairvoyance, and spiritual-

istic phenomena. Men of science, with few exceptions, dismissed all these things as belonging entirely to the realms of superstition and fraud. The founders of the society, while recognizing the part played by trickery, malobservation, and defective recording of facts, thought that there was sufficient evidence for the genuineness of some phenomena to justify investigation.

Time has already justified the society in respect of part, at least, of its programme. Hypnotism, once left to the quacks and showmen, has been definitely annexed by science, and is recognized as a legitimate therapeutic agency. Automatic writing, in which the hand of the scribe writes, without his will, matter of which he may have no conscious knowledge, has been proved to be a genuine phenomenon, and, taken with the facts of hypnotism, has largely suggested the idea of the unconscious self, which plays so important a part in modern psychological study.

Most workers in this field agree that genuine telepathy—*i.e.* the influence of mind on mind apart from the recognized channels of communication—actually takes place. Recent experiments have also provided evidence for clairvoyance—*i.e.* direct supernormal apprehension of facts without the intervention of another mind—and precognition.

The careful inquiries of the society leave little, if any, room for doubt that many persons in a perfectly normal state of mind and health, but perhaps endowed with special sensibility, have from time to time seen visions or apparitions of friends or strangers, sometimes living, sometimes dead. The records contain many apparently well-substantiated cases in which the phantasm has occurred at or near the time of death of the person seen, or when he was in critical danger, and a certain number in which the actual details of the event were presented. And it is difficult to brush away the evidence that in some instances apparitions "haunt" definite places. The establishment of the facts is one thing, their interpretation another, and an extremely difficult one. Various explanations may reasonably be given for various types of occurrence: for some, normal subconscious activity; for others, the supernormal faculties of living persons, *e.g.* telepathy; but there are other phenomena for which some explanation outside the living individual has been postulated, such as communication from the

dead or a "cosmic reservoir," in which, so to speak, all human experiences are stored, and from which they may be drawn again in favourable circumstances and by certain individuals.

Interest in psychical phenomena naturally centres upon the question how far they yield trustworthy evidence of survival after death. Apart from the study of alleged phantasms of the dead, inquiry into this most obscure subject has taken two main directions. The first is the study of the utterances of "trance-mediums," which often purport to give communications from the dead to their living friends. The difficulty here is to exclude the possibility that the medium, even without intended fraud, may make use of conscious or unconscious knowledge, of indications given unwittingly by the visitors, or of telepathic communications from living persons. The second direction is the study of cross-correspondences between automatic writings. In some instances automatic writers, unknown to one another and of unimpeachable honesty, have produced scripts which were unintelligible until one was supplemented by the other; and it has been supposed that in such cases a disembodied intelligence has deliberately given his message in part to each writer, in order to demonstrate his continued existence.

Abnormal psychical phenomena of bewildering variety have been reported, both in the presence of recognized mediums, and in so-called "Poltergeist" cases of violent movements and breakages of furniture, crockery, etc. Both types of occurrence call for investigation by experts in detecting trickery, the ordinary observer being easily deceived. The experts are not agreed as to whether trickery explains everything. In "Poltergeist" cases the rôle of medium is frequently taken by a mentally and physically subnormal adolescent, who may be unconscious of the tricks he (or she) is playing. See *Dream*; *Haunted House*; *Poltergeist*; *Spiritualism*.

Bibliography. Phantasms of the Living, E. Gurney, F. W. H. Myers, and F. Podmore, 1886; *Studies in Psychical Research*, 1897, and *Modern Spiritualism*, F. Podmore, 1902; *Human Personality*, F. W. H. Myers, 1903; *Science and Psychical Phenomena*, G. N. M. Tyrrell, 1938; *Fifty Years of P.R.*, H. Price, 1939; *Telepathy*, W. Carington, 1945; *The Personality of Man*, G. N. M. Tyrrell, 1947; *Publications of the Society for Psychical Research*, and

the American S.P.R.: *The Journal of Parapsychology* (Duke University, U.S.A.).

Psycho-Analysis (Gr. *psychê*, soul; *ana-*, again; *lûo*, loose). Name given by Freud to his method of investigating the unconscious. The term has come to cover in a general sense the whole body of Freud's teaching. The method is based upon the theory that continual mental conflicts are going on in all minds below the threshold of consciousness, their object being to isolate and keep away from observation ideas, feelings, wishes, which are abhorrent to conscience. As a rule this attempt is only partially successful, and the repressed material filters through under various disguises in dreams, symbolic acts, etc., or manifests itself in neurotic symptoms. For cure it is necessary (1) to make the patient's ego able to tolerate the knowledge of the repressed material, (2) to bring it back into consciousness, and (3) so to modify and rationalise the super-ego (whose original harshness has led to the repression) that the patient will not suffer more anxiety than he can bear when each conflict is brought into the open.

The process of analysis is based upon the facts that repressed material is always striving to return to consciousness, and that the repressing force of the super-ego is lessened in sleep and other quiescent states of the mind. The patient is therefore asked to recline upon a couch in a soothing atmosphere, and is then required to associate freely to some idea which makes a suitable starting point, e.g. a dream or the stage reached at the end of the previous analytic session. The flow of associations will sooner or later lead back to some repressed conflict which is at the moment near the surface and active. When the analyst judges that the right moment has come, he will offer as much of an explanation as he believes that the patient can accept.

This treatment leads not only to the revealing of the buried memories which are the source of the conflict, but also to a release of the feelings which were repressed with them. These are then vented upon the analyst, who is made, so to speak, to play the part of all the people who were concerned in the drama which precipitated that particular conflict. This projection of emotion is known as the transference, and the analyst for his part must at this stage be able to bear having great quantities of

hatred, scorn, neurotic love, etc., hurled at him without reacting except as a doctor and a scientist. When each of these feelings has been explained to the patient, the normal relation of confidence between doctor and patient must be restored before the work can proceed afresh.

Since one repression leads to another, and both serious mental disease and strongly anti-social traits of character are the result of accumulations of stresses which started in early childhood, conflict after conflict will have to be uncovered and resolved. Cure is, of course, effected only when the patient has achieved self-dependence. See *Ego*; *Repression*; *Super-Ego*; *Unconscious*.

A. Blanco White

Bibliography. The Psycho-Analysis of Children, M. Klein, 1932; *Introductory Lectures in Psycho-Analysis*, S. Freud (in English), 1934; *An Investigation of the Technique of Psycho-Analysis*, E. Glover and M. Brierley, 1940; *Psycho-Analysis Today*, E. Jones, A. A. Brill, and others, 1946; *The Psycho-Analytic Treatment of Children*, A. Freud, 1947.

Psychology (Gr. *psychê*, soul; *logos*, a discourse). Biological science having for its object the study of mind. For those who do not believe that mind exists and regard all "mental" phenomena as activities of the brain and nervous system, psychology is simply a branch of physiology. The fundamental nature of the relation between body and mind is left by both sciences to philosophers, psychologists acting on the working assumption that both bodies and minds exist and can be separately dealt with and described, and that they are in a continual state of interaction. On the one hand all knowledge of the external world reaches the mind through the senses; poisons which affect the brain disturb the mind, etc. On the other bodily reactions to stimuli can be governed by thought, and strong emotions, etc., control much bodily functioning. Medical discoveries, such as the use of shock therapy for depression and leucotomy for manic behaviour, serve to show, if this be necessary, how close is the tie between body and mind.

Psychology in relation to animals deals with observation of their behaviour and attempts to estimate the degree of their intelligence and the acuteness of their perceptions. The chief points of difference between human beings and animals, apart from

speech, are the possession by the former of reason and conscience. Reason is found in a rudimentary state in chimpanzees, and both mechanisms exist in domesticated dogs; but their rôle in the life of man is immeasurably greater.

The nature and function of the human mind have always been matters for speculation, and until the 19th century it was assumed that psychology was a branch of philosophy. Philosophers felt free to advance theories of the mind and to support them by data drawn almost exclusively from observation of their own mental processes. Since the minds of philosophers differ in many respects from those of men in general, the knowledge obtained in this way was not only full of subjective errors and of a peculiar and forbidding aridity, but was as a rule almost useless for application to the problems of ordinary life.

Until the last quarter of the 19th century few people doubted that the mind consisted of elements which were, or had been, present to consciousness. It was recognized that memories not in use at any particular moment must, so to speak, have "somewhere to go to," and something analogous to a mental storage department was therefore postulated to contain these memories. But nothing was known of this region until the publication of the findings of the psychiatrist Sigmund Freud. Freud posited not only a "pre-conscious" wherein lie memories, beliefs, purposes which can be recalled when needed, but also an "unconscious," inaccessible by ordinary methods of observation, but with a strong life of its own which continually affects the conduct of the individual. Freud's system is still rejected by many psychologists; but its existence has revolutionised the study of the mind, both normal and abnormal, and the treatment of mental disease.

Anything that mankind is doing or has ever done may provide a subject for psychological investigation. Different workers are attracted by different fields, and the range of objects is so large that many of them are unrelated. Attempts are often made, for instance, to classify human beings into different types. The best known are those of Jung (*q.v.*), who divided them into introverts and extraverts, and Kretschmer, who thought of them as pykniaks and schizoids. A more useful division is into types indicating the mental disorders that charac-

terise their extreme instances—obsessional, hysterical, etc.

Other topics which have attracted workers are the methods by which children put together the data provided by their senses and build up a more or less accurate picture of the world around them; the psychology of study; the nature of musical appreciation. The general change from assumption to observation has been especially important in connexion with education, where the starting point becomes how children do behave instead of an assumption as to how they ought to behave.

Psychological methods have been strikingly applied in the sphere of group and social psychology; in both the U.K. and the U.S.A. psychology is used to elucidate industrial problems; and it has been employed in the selection and training of candidates for particular posts in the civil service, the fighting services, industry, etc.

A. Blanco White
Bibliography. Introduction to the Psychology of Religion, R. H. Thouless, 1923; Psychology and Morals, J. A. Hadfield, 5th ed., 1925; A Hundred Years of Psychology, J. C. Flugel, 1933; New Propaganda, A. Blanco White, 1939; Introduction to Industrial Psychology, E. May Smith, 1943; Introduction to Social Psychology, W. McDougall, 28th ed., 1946; Work of Psychologists and Psychiatrists in the Services, H.M.S.O., 1947; Normal and Abnormal Psychology, J. E. Nicole, 1948.

Psychoneurosis. Mental disorder, the result of a chain of abnormal psychological processes. Anxiety states and obsessions come under this classification. See Hysteria; Neurasthenia; Neurosis.

Psychophysics (Gr. *psychê*, soul, mind; *physis*, physics). Term invented by the German philosopher Fechner, and defined by him as a theory of the exact relations between mind and body, and, generally speaking, the relations between the psychical and physical worlds. According to Wundt, it consists in the investigation of the relations that can be shown empirically to exist between the psychical and physical aspects of vital processes. The object is to discover these relations; beyond that its interest ceases. Psychology examines these relations from the point of view of the mind; physiology, from the point of view of the body.

Psychosis. Disorder of the mind, not due to recognizable psychological processes as are the neuroses and psychoneuroses.

The term is in practice equivalent to mental disorder (*q.v.*).

Psychotherapy (Gr. *psychê*, soul; *therapeia*, treatment). Treatment of mental disorders by influencing the mind. Used generally for the treatment of hysteria, neurasthenia, and kindred affections, it embraces treatment by suggestion, hypnotism, psychoanalysis, and re-education where function has been impaired in the absence of organic disease.

Psychrometer. (Gr. *psychros*, cold; *metron*, measure). Wet and dry bulb thermometer. It consists of two thermometers, one with a bulb exposed to the air, and the other with the bulb covered with muslin kept wet with water. The first gives the direct air temperature; the second a lower temperature due to the evaporation of the water. The drier the atmosphere the more rapid the evaporation, and the greater the difference of temperatures recorded by the two thermometers, so enabling the amount of moisture in the atmosphere to be calculated. The depression of the wet bulb also depends upon the rate of flow of the air over the bulbs. In the Assmann psychrometer a known and constant rate of ventilation is obtained by using a mechanically driven fan.

Ptah. Egyptian deity. The local god of Memphis in the 1st dynasty, he was the divine artificer, creating all things out of the Nile mud. Assimilated to other gods—Osiris, Apis, Sokar—he is represented with a mummified body, wearing a skull-cap. In later times, as a bandy-legged dwarf, he resembled the Greek Hephaestus. See Egypt.

Ptarmigan (Gaelic *tarmachan*). Species of grouse (*Lagopus mutus*), found in the mountainous districts



Ptarmigan. Hen bird of this species of grouse
W. S. Berridge, F.Z.S.

of N. Europe. In the summer the plumage is brownish grey marked with black lines and dark spots, and in winter it is white with the exception of a small scarlet comb, a black line on each side of the head, and black outer tail feathers.

It is only the British bird that thus changes its plumage for protective purposes. It is 14 ins. long, and the legs and feet are thickly feathered. In Great Britain it is restricted to the highest parts of the Scottish highlands and to some of the western islands. Both in summer and winter it so closely resembles its surroundings that it is difficult to detect until it takes flight. In the nesting season the hen sits so close that she may be approached without difficulty, and when the young are about, the hen will endeavour to draw off an intruder by running near him with a trailing wing as if wounded. The ptarmigans seen in the markets are mainly willow grouse imported from Scandinavia. See Bird; Grouse.

Pteridophyta (Gr. *ptēris*, fern; *phyton*, plant). Botanical group which includes the ordinary ferns, the water ferns (Marsileaceae), the club mosses (Lycopodiaceae and Selaginellaceae), and the horsetails (Equisetaceae). Anatomically the pteridophyta are more complex than the mosses; the specialisation of tissues for distinct functions has reached a higher stage of efficiency. In the same way as the mosses they exhibit a regular alternation of generations, but with a difference. The fern-plant produces spores and is the asexual generation; from the spore is produced a small green body, not as a rule exceeding a quarter of an inch in length, known as the prothallus, and this bears the male and female organs. From the fertilised egg the new fern-plant arises. It is therefore the fern-prothallus which corresponds to the moss-plant. In some pteridophytes, e.g. *Selaginella*, two kinds of spore are produced, larger (megaspores) and smaller (microspores); each spore on germination forms a prothallus. The prothallus developed in the megaspores bears female organs, while the microspore furnishes the male gametes. See Fern.

Pteris (Gr., fern). Genus of ferns of the family Polypodiaceae. Natives of all regions, they have usually creeping rootstocks. The leaves or fronds are of varied form, but usually divided into strap-shaped lobes. Bracken (*Pteridium aquilinum*) used to be included in this genus. The distinguishing feature is the massing of the spore-capsules in a continuous line around the margin of the frond or its divisions. Many species are in cultivation as ornamental plants.

Pterobranchia (Gr., wing-gilled). Small group of minute organisms dredged from the depths



Pterobranchia. Cephalodiscus dodecalophus, from the Straits of Magellan. A. Colony. B. Highly magnified individual specimen, indicated by a in A

of the ocean. They were formerly supposed to be polyzoa, but are now regarded as hemichorda (q.v.).

Pterodactyl (Gr. *pteron*, wing; *daktylos*, finger). Name given to the flying lizard, the fossil remains of which are found in rocks of Mesozoic age. Varying in size from only a foot in the spread of their wings up to some 20 ft., these reptiles were remarkable for their bird-like habits. The wings, however, resembled more those of the present-day bat, being a membrane attached to the body and stationed between the long, jointed fingers of the fore limbs.

The hind legs of the pterodactyls bore a strong resemblance to those of reptiles, but the heads of many were more bird-like, possessing jaws covered with a horny beak. In some members the jaws were provided with strong conical teeth. The bones were hollow, in this respect resembling birds, the skulls pointed, the eyes large, and in some of the earlier



Pterodactyl. Skeleton of *P. spectabilis*, a short-tailed flying reptile. By courtesy of the trustees of the British Museum

forms the tail was very long and slender. The majority were incapable of long-sustained flight. Remains of the reptile have been found in England, Europe, and N. America. See Lizard.

Pteropoda (Gr. *pteron*, wing; *pous*, foot). Group of marine molluscs. They were formerly ranked as a separate order, but are now included in the Gastropoda (q.v.). The foot has been modified into a pair of wing-like processes, by the aid of which the animal swims. Hence

they are popularly called sea butterflies. Some of them bear small, transparent, glassy shells, and some species form the chief food of the baleen whales. The majority are tropical. See Mollusca.



Pteropoda. Shell-bearing Cavolinia tridentata

Pterosauria (Gr. *pteron*, wing; *sauros*, lizard). Name given to extinct flying reptiles that are known also as ornithosauria and pterodactyls. See Pterodactyl.

Ptolemaic System. Theory expounded by the ancient Egyptian Ptolemy to account for the movements of heavenly bodies. He supposed that the moon, sun, and stars revolved in circles about the earth. Beyond the earth, and beyond the fire and water which it supported, was the ether. The zones of the heavens were in and beyond the ether, each zone a transparent spherical shell. Each shell or sphere had its own heavenly body which, revolving with it, moved round the earth.

The innermost sphere was that of the moon, and the others in order were those of Mercury, Venus, the sun, Mars, and Jupiter, with Saturn and the fixed stars sharing the eighth outer sphere. Afterwards a ninth sphere was added to explain the slow movement of the precession of the equinoxes, and beyond that a tenth sphere to account for day and night. The tenth sphere or *primum mobile* therefore revolved from E. to W. in 24 hours and carried along with it all the inner spheres. The apparent progression and regression of planets were accounted for on the supposition that each moved in a circle on its own sphere, while the latter moved round the earth. This theory dominated astronomical thought till the time of Copernicus (q.v.). See Astronomy; Deferent; Epicycle.

Ptolemais OR **ACE**. Ancient city of Phoenicia. Lying S. of Tyre, it is now known as Acre (*q.v.*)

Ptolemy OR **CLAUDIUS PROLEMAEUS** (*f.l.* A.D. 127–51). Egyptian astronomer and geographer. The dates of his birth and death are unknown, all that is certain being that he conducted his observations in Alexandria during the reigns of Hadrian and Antoninus Pius.

Ptolemy was one of the most eminent scientific men of the ancient world. He not only co-ordinated the scientific knowledge of his time but added to it results of his own which have stood to the present day. His doctrines were incorporated in his great work in 13 volumes, called by the Arabs the *Almagest* (*q.v.*).

In what must be regarded as one of the greatest works of the ancients, Ptolemy treats of the positions and motions of the earth, moon, sun, and stars, and makes and proves the statement that the earth is a sphere. His work contains theorems and problems in trigonometry and geometry which are of fundamental importance, the length of the year, a catalogue of stars of the N. hemisphere, motions of the planets, etc.

As a geographer, Ptolemy was as celebrated as he was as an astronomer and mathematician. His *Geographikḗ Syntaxis* dominated its own particular sphere as his *Almagest* did astronomy, and Ptolemy's concept of the world held till the 15th century. It was the first attempt to place geography on a scientific basis. He laid down the latitude and longitude of places and constructed maps of the known inhabited world on a mathematical basis far in advance of his time. See *Astronomy*; *Map*; *Ptolemaic System*. Consult also *Works*, ed. J. L. Heiberg, 1895–1907; *Geographia*, ed. C. F. A. Nobbe, 1842–45; *The Geography of Ptolemy Elucidated*, T. G. Rylands, 1893; *Planetary Systems*, J. L. Dreyer, 1906; *Introduction to the History of Science*, G. Sartori, 1927–31.

Ptolemy I Soter (367–283 B.C.). King of Egypt. He was one of the favourite generals of Alexander the Great, at whose death in 323 he became satrap of Egypt, and in 305 assumed the kingly title, thus inaugurating the Ptolemaic dynasty, which lasted until 30 B.C. After his death he was called Ptolemy Lagi. The aid sent in 304 to Rhodes, when

besieged by Demetrius Poliorcetes, earned for him the name Soter (Gr., saviour). Soter founded Ptolemais in Upper Egypt, as a rival to Thebes, undertook many overseas adventures, and twice occupied Jerusalem. He fostered the commercial and intellectual interests of his capital at Alexandria, built the Serapeum, and planned the famous library and museum, where under his auspices Euclid taught mathematics. In 285 he abdicated, and died two years later.

Ptolemy II Philadelphus (308–246 B.C.). King of Egypt. Born in Cos, a younger son of Berenice, he succeeded on his father Soter's abdication in 285. Establishing sea-command in the Mediterranean, he annexed Coele-Syria and Phoenicia, and fostered trade with Somaliland. He opened a canal from the Nile to the Red Sea, and founded in his mother's honour the port of Berenice. He maintained diplomatic relations with the Indian emperor Asoka, completed the lighthouse on the Pharos islet at Alexandria, and built the great pylon at Philae.

His first wife, Arsinoë I, daughter of Lysimachus of Thrace, was banished in favour of his own sister, Lysimachus' widow, Arsinoë II. He wedded her, and, at her death in 270, deified her as Philadelphus (Gr., loving a brother or sister), a title afterwards attached to himself also. In her honour he reclaimed land in the Fayum, calling it the Arsinoite nome.

Ptolemy III Euergetes (281–221 B.C.). King of Egypt. Elder son of Arsinoë I, he succeeded his father Philadelphus in 246, and by marrying Berenice, daughter of Ptolemy Soter's stepson Magas, added Cyrenaica to Egypt. He overran the Seleucian kingdom to Babylon and Susa, bringing back many Egyptian deities carried away by Cambyses. Hence he and his consort were deified with the title Euergetae (Gr., benefactors), and the decree of Canopus (*q.v.*) was promulgated in their honour.

During his reign Ptolemaic sea-power reached its acme. The splendid Edfu temple and a pylon at Karnak (*q.v.*) were founded by him. See *Eratosthenes*.

Ptolemy V Epiphanes (209–181 B.C.). King of Egypt. Succeeding his father Ptolemy IV Philopator in 205, under guardians, his minority was marked by the invasion of Egypt's overseas possessions by Antiochus the Great and Philip V of Macedon.



Ptolemy V Epiphanes, King of Egypt
From a coin

The intervention of Rome confirmed to the Seleucid king Coele-Syria and Phoenicia. Epiphanes (Gr., illustrious) was declared of age in 197. He wedded a daughter of Antiochus, Cleopatra I, who brought as a dowry the revenues of Coele-Syria and Palestine. The financial measures associated with a projected Syrian campaign led to his death by poisoning. See *Rosetta Stone*.

Ptolemy VI Philometor (186–145 B.C.). King of Egypt. Son of Cleopatra I, he succeeded his father Epiphanes in 181, under his mother's regency until her death about 173. The invasion of Egypt by Antiochus IV Epiphanes, and the capture of Philometor at Memphis, are referred to in Dan. 11. His younger brother, nicknamed Physcon (Gr., obese), was proclaimed king in 170, and for the rest of the reign there was intermittent rivalry between them, each being supported in turn by Rome. Shortly after being proclaimed king of Syria, Philometor fell in battle near Antioch.

Ptolemy X Soter II (d. 80 B.C.). King of Egypt. Son of Cleopatra III, he succeeded his father Physcon at his death in 116. He was formerly ranked as Ptolemy VIII, but as two other Ptolemies, Eupator and Neos Philopator—who were perhaps both sons of Philometor—reigned between Epiphanes and



Ptolemy VI Philometor, King of Egypt
From a bronze bust



Ptolemy III Euergetes, King of Egypt
From a coin



Ptolemy X Soter II, King of Egypt
From a bronze bust



Ptolemy I Soter, King of Egypt
From a coin

Physcon, *Lathyrus*, or **Soter II**, now usually ranks as **X**. His mother was co-regent until in 110 he exercised sole authority, but three years after was banished in favour of his younger brother, **Ptolemy XI**, or **Alexander I**. He in his turn was deposed in 88, and *Lathyrus*, recalled from Cyprus, reigned a second time until his death.

Ptolemy XIII Auletes (95-51 B.C.). King of Egypt. On the assassination of **Ptolemy XII** (**Alexander II**) in 80 the legitimate line ended. The throne was offered to a natural son of *Lathyrus*, nicknamed **Auletes** (Gr., flute-player), from his proficiency with that instrument. He married **Cleopatra V**, and on her death about 69 fled to Rome, his daughter **Berenice IV** being put in his stead. Rome reduced *Cyrenaica* to a Roman province and confiscated Cyprus, but acknowledged **Auletes** as legitimate sovereign of Egypt, on payment of a tribute of 6,000 talents. **Auletes** greatly embellished *Philae*.

Ptolemy XIV Philopator (61-47 B.C.). King of Egypt. On the death of **Auletes** in 51 his eldest son, **Philopator**, and his daughter, **Cleopatra**, ascended the throne jointly, under the guardianship of the Roman senate. In their fourth year the queen was banished, and raised an army in Syria, but without avail. After his defeat at *Pharsalia* **Pompey** sought refuge in Egypt, but was slain at **Ptolemy's** instigation. On **Julius Caesar's** arrival at *Alexandria* **Cleopatra's** cause was espoused by him. In 47 **Ptolemy** was drowned after a battle on the Nile, and his sister was reinstated, with their brother, **Ptolemy XV**, as co-regent. See **Cleopatra**.

Ptomaine (Gr. *ptōma*, corpse). Alkaloidal substances formed in the process of putrefaction of nitrogenous organic tissues. They have been regarded as responsible for the symptoms in cases of poisoning by meat, but many, if not all, such cases occur because the meat has become infected with disease-producing micro-organisms. The bacteria chiefly associated with this form of poisoning are of the dysentery group. Further symptoms are due partly to the development of germs in the intestine. Treatment consists in clearing the gut, controlling shock, and keeping the heart at work.

Ptoxis (Gr. *ptōxis* from *ptōtein*, to fall). Inability to raise the upper eyelid. It may be congenital, or due to injury or disease, producing paralysis of the nerve which supplies the eyelid, locomotor ataxia being the most common. See **Eye**.

Ptyalin (Gr. *ptyalon*, saliva). Enzyme in the saliva. Secreted by the salivary glands, it acts on starch, splitting it into the simple substances, dextrin and maltose, which can be absorbed in the intestinal tract.

Puberty (Lat. *puber*, mature). Age at which the reproductive organs become functionally active. In boys, in temperate regions, changes characteristic of puberty generally appear between the 14th and 16th years, when the secretion of the testes is poured into the blood. The rate of growth is increased, the frame and general build begin to approach those of the man, hair appears in the pubic region, the tones of the voice become deeper, and for a time some slight want of control over the pitch of the voice gives rise to the occasional squeakiness known as "breaking" of the voice. Pugnacity and desire for adventure are psychological attributes. In girls, puberty generally occurs between the ages of 13 and 15, when the ovarian secretion passes into the bloodstream. The figure fills out, the breasts become enlarged and rounded, and the menstrual function is established, while modesty and shyness are psychological concomitants. The hotter the country, the earlier puberty tends to occur.

Publican (Lat. *publicanus*). In ancient Rome, a contractor for public business, but more especially for the collection of taxes. The tax-farmer paid the state a certain sum and found his remuneration in what excess revenue he could collect, a vicious system, which inevitably caused injustice and oppression. In practice, owing to the heavy financial responsibility involved, publicans formed themselves into syndicates to carry out any particular contract. The farming of taxes was for long a coveted privilege of the equestrian order at Rome, which was chiefly composed of capitalists and men of business. The actual work of collecting the taxes was done by slaves, freedmen, and other people of humble rank. See **Equites**; **Licensing Laws**.

Public Assistance. Name given by the Local Government Board Act, 1929, to what was formerly called poor relief and from 1948 was termed national assistance.

Since the 16th century the relief of the poor had been primarily the responsibility of the parish. The overseer of the parish was empowered to levy a payment from every resident for that purpose. There was thus main-

tained a local interest in suppressing vagrancy and idleness, and a stigma came to attach to receiving poor relief. The poor law tended to be administered harshly and at times viciously, particularly in workhouses. In 1834 an Act established poor law unions, provided for the election of boards of guardians for each, and established a Local Government board to supervise their administration. The Local Government Board Act, 1929, transferred to the ministry of Health the functions of the Local Government board and to the county authorities the functions of the boards of guardians. Each county council then had to appoint a public assistance committee and local sub-committees for each poor law area of the county.

The National Assistance Act of 1948 transferred responsibility for the relief of the poor from the county to the state, acting through the national assistance board, which is responsible for unemployment assistance, uninsured old age pensions, blind persons' assistance, etc. The Act marked the end of the old poor law system, instituted by an Act of 1601. See **Poor Law**; **Social Security**.

Public Authorities Protection Act. Passed by the British parliament in 1893. It required all legal proceedings against public authorities for acts, neglects, or defaults in their public duties to be begun within six months of the act or default. The time was extended in civil proceedings to one year by the Limitations Act, 1939. With public bodies established since the Second Great War the practice is to provide for special periods of limitation of proceedings; e.g. the period is three years for proceedings against the coal board or the corporations set up by the New Towns Act, 1946.

Public Company. Company in which the shares are held by the public and are readily transferable. To form a registered company certain documents have to be filed with the registrar of companies. The most important of these is the memorandum of association. For a public company this has to be signed by at least seven persons. The memorandum must state (a) the proposed name of the company, with "Limited" as the last word (if the liability of the members is to be limited); (b) the part of the United Kingdom in which the registered office of the

company is to be situate; (c) the objects of the company. The "subscription clause" requests that the seven signatories may be formed into a company in pursuance of the memorandum, and states the number of shares for which each undertakes to subscribe. If the company is limited by shares, the memorandum must also state that the liability of the members is limited, and the amount of the share capital with which the company is to be registered and its subdivision into shares. If the company is limited by guarantee, the memorandum must also state the amount which each member undertakes to contribute should the company be wound up. Many professional organizations, sports clubs, etc., are companies limited by guarantee. The objects clause of the memorandum strictly defines the scope of the activity of the company, and can be altered only with difficulty; consequently it must be drafted with great care. For this reason the formalities of registration, which are simple, are generally entrusted to a solicitor or a company registration agent.

Consulting the Files

Each registered company has a file in the Companies Registration Office, Bush House, London, W.C.2. On payment of a nominal fee any member of the public can consult the file of any registered company. The file contains a copy of the memorandum of association, the articles of association, the prospectus or statement in lieu of prospectus, the annual return (containing a summary of share capital and shares, a list of shareholders, particulars of directors and the secretary, particulars of mortgages and other registered charges, the directors' report, the balance-sheet and the auditors' report). The Companies Act requires public companies to file periodically various documents, so that members of the public who may be interested can refer to the file for precise information. In 1946 there were 216,000 registered companies in the U.K.; of these, 13,000 were public companies and 203,000 private companies. The public companies had a total paid up capital of £4,078 millions—an average of about £300,000; the private companies had a total paid up capital of £1,923 millions—an average of about £9,000.

Public Enemy No. 1. Term officially used in the U.S.A. to describe a criminal, offending against

federal as distinct from state laws, who is regarded as the most dangerous man of his time. It was first applied in 1932 to describe John Dillinger (*q.v.*) and after his death, 1934, to Al Capone (*q.v.*).

Public Health. Term for the collective physical health of the community, and the steps taken by the community to maintain this. The general hygiene which it connotes is directed towards the elimination or amelioration of unfavourable conditions affecting the health of the public at large, and thus to the increase of health and the prolongation of life. Its instruments are the machinery of education and the powers and provisions of organized authority for safeguarding the health interests of the community, where ignorance, indifference, or avarice runs counter to them. The various public health provisions that are made for the common good, necessary and valuable though they are, cannot in themselves secure a high level of public health, for this is in great measure dependent on the hygienic concern and habits of the people in the intimate circumstances of their living. Popular education and training in such matters are essential.

Public health, however, does not relate solely to physical well-being; it involves also morals and economic conditions. Thus all measures that are calculated to raise the standard of social well-being, physically and morally, fall within the realm of public health—the ultimate aim being to secure in the greatest possible number the healthy mind in the healthy body. The aim of preventive medicine is to make human knowledge of all preventable disease as complete as possible, and to apply this knowledge to the best advantage. It seeks to prevent or remove all those circumstances which cause or favour the appearance and propagation of disease; and to increase the individual power of resistance.

Disease is not an eliminator of the unfit only; it destroys indiscriminately. Preventive medicine, therefore, is, if anything, in more urgent need of continuing development than is curative medicine. The effects on public health of general medical services working fully on hygienic and preventive lines, which became a possibility with the introduction of the national health service in July, 1948, are almost incalculable; for it is the general practitioner

who, with his first-hand knowledge of the needs of the individual, is at grips with the essential problems of preventive medicine.

Hygiene, or the art of preserving health, has been taught and practised since before the time of Hippocrates, a great teacher of the subject so far as empiricism could advance it; but it did not acquire a scientific basis until the knowledge of the laws of life (physiology) began to be studied, in the light of which the causes of disease could be discovered and prevented. Sydenham's observations upon the national history of infectious disease (1661-76) disclosed facts which stimulated the study of epidemiology long before the agents directly responsible for infection were known.

The doctrine that infection spreads by minute parasitic organisms of a specific nature was first philosophically maintained by Fracastoro in the 16th century; but Pasteur's discoveries (1856-64) made possible an immense step forward in care of public health. The period 1760-1800 saw the beginning of public health effort in Great Britain, though public concern led only in 1847 to the appointment of the first public health official, Dr. Duncan of Liverpool.

Community and the Individual

In the earlier days of organized public health endeavour, the central and local health authorities concerned themselves with the abatement of grossly insanitary conditions and with efforts to prevent the spread of certain specific diseases, regarded as more particularly affecting the health of the community. With a broadening outlook an increasing regard came to be paid to the individual. This was first manifested in the growing provisions for the care and treatment of the sick; and the provision of a healthy environment for the well.

Provisions for guarding the health of the individual include care of the expectant and nursing mother and her infant, medical inspection of school children, allotment of important foodstuffs in time of shortage to special sections of the community, as well as the services provided under the National Health Service Act, 1946. Extension of public health provisions has been the result of a growing recognition of the relationship between health, industrial efficiency, and poverty; and public health work engages

personnel who minister to the sick, protect from disabilities and incapacities, and regulate personal and industrial hygiene.

The marked reduction in infant mortality in many countries during the 20th century was a result of combating parental ignorance through the provision out of public funds of infant and antenatal clinics, child welfare centres, and related activities. Legislation has been introduced in the U.K. and elsewhere relating to child-birth, infancy, and childhood, the school child, those industrially employed in factories and workshops, housing, national health insurance, and communicable disease. Measures have been put in operation against tuberculosis and venereal disease, two of the greatest enemies of public health. With increasing knowledge of the causal agents of infection, provisions for the prevention and cure of communicable disease have become more effective. Especially is this true in reference to the bacteriological diagnosis of cases of disease which cannot be diagnosed with certainty by clinical methods, to the discovery of preventive inoculations to confer temporary immunity from attack, and of curative inoculations to reduce mortality. The use of ever-improving methods of diagnosis and the prompt notification of communicable disease, the isolation or quarantine of sufferers, and the necessary disinfection have increased the control of most forms of communicable disease.

In England and Wales the Local Government board was the central controlling department in most matters of public health until 1919, when the ministry of Health (*q.v.*) was established. Public health administrative authorities embrace county councils, county borough councils, borough councils, urban and rural district councils; and the public health service of local authorities includes a legal and clerical staff, an engineering and surveying staff, and a sanitary staff under the direction of the M.O.H. See Death Rate; Disease; Health Centre; Infant Mortality; Preventive Medicine.

Public Health and Hygiene. ROYAL INSTITUTE OF. Body formed in 1937 by amalgamation of the Royal Institute of Public Health (founded 1886) and the Institute of Hygiene. Its function is to promote the interests of those working upon public health at home and overseas. It is recognized as a public educational

institution, its lectures and instruction in bacteriology, chemistry, biochemistry, sanitary law, industrial diseases, and vital statistics at the laboratories in Queen Square, London, W.C.1, being accepted as preparing for degrees and diplomas in public health of universities and medical corporations of the U.K. The address of the institute is 28, Portland Place, W.1, and it has an official journal.

Public House. Licensed house where alcoholic liquors are provided for retail sale and consumption within specified hours. See Inn; Licensing Laws.

Public House Trust. This organization, founded by temperance interests for the acquisition of hotels, public houses, etc., is now known as Trust Houses Ltd. See Trust House.

Public Opinion. Term to denote the predominant view of a community on a particular subject. Measuring public opinion on contemporary questions has become a social science, and questionnaires to establish it are conducted by such organizations as the Gallup Poll (*q.v.*) and Mass Observation (*q.v.*). It is generally held that public opinion is reflected in a nation's legislature, but this is not always so; sometimes public opinion is ahead of the legislature, sometimes the legislature loses touch. An instance of the former was the U.K. parliament's opposition to electoral reforms demanded by public opinion in 1831-32; of the latter, public disagreement with the inclusion by the house of commons 1948 of a clause in the Criminal Law Amendment Bill proposing the suppression of the death penalty for murder.

Public Policy. Comprehensive legal term for the overwhelming interest of the country as a whole. In English law, a contract which is immoral, or in unreasonable restraint of trade, or of a fraudulent or criminal character, is said to be against public policy, and is unenforceable. The courts will not lightly hold a contract to be void on this ground. The chief classes of contracts attacked by the doctrine are contracts not to trade, or not to work, and for this reason all trade unions, whether of masters or men, cannot enforce at law the contracts entered into between them and their members. See Trade Union.

Public Record Office. For an account of this institution, see Record Office.

Public Relations Officer. Employee of a business firm or govt.

service whose duty is to foster good relations between the organization and the general public. He is usually expected to keep in direct touch with public opinion, so far as it may affect his firm or department, through organized inquiry; to act as representative on public committees of all kinds; to answer inquiries; to arrange lectures, exhibitions, etc. Usually, too, he acts as, or is responsible for the activities of, a press officer. See Press Officer.

Public School. The exact meaning of this term in the U.K. has changed from time to time, and it is still used loosely to denote (as in the U.S.A.) a school that is not privately owned and controlled. The latest official definition is in the terms of reference of the Fleming Committee, appointed in 1942 "to consider means whereby the association between the public schools (by which term is meant schools which are in membership of the governing bodies association or the headmasters' conference) and the general educational system of the country could be developed and extended..." Public schools so defined comprised 89 "independent" schools and 99 aided either by grants from the ministry of Education or by the local education authorities. The Education Act of 1944 allowed local authorities to provide education of the public school type where this seemed to suit parents and pupils.

The Public Schools Act of 1868 dealt with only seven schools—Eton, Winchester, Westminster, Charterhouse, Harrow, Rugby, Shrewsbury. The headmasters' conference was established by Thring, headmaster of Uppingham, as a protest against the exclusion of these seven from the Endowed Schools Act of 1869. Membership of this conference came to be one of the criteria of status as a public school. An association of governing bodies of public schools was founded in 1940; in 1942 came a similar association in respect of girls' schools. The associations act only in an advisory and consultative capacity.

The term public school therefore came to include a great diversity of institutions. Some are wholly boarding schools; some wholly or mainly day schools; a few independent ones are primarily day schools. Out of 99 direct-grant, aided, or maintained schools, 15 have more boarders than day boys, and 42 are wholly day schools.

The schools have markedly different histories. Canford, Stowe, and Bryanston were established after the First Great War. Others belong to the 19th century. The majority have had a continuous existence, with fluctuating fortune, during several centuries; Lincoln school dating back to 1090, Carlisle grammar school to 1170. Some developed from medieval grammar schools set up by individual endowment or by the Church to prepare the sons of landowners and merchants for university, Church, or law. Others, like Winchester college, were established as "perpetual colleges" where "poor and needy scholars" might live as a community and study beside the sons of "nobles and influential persons." Several public boarding schools for girls came into being during the last quarter of the 19th century. Consult Public Schools and the General Educational System, H.M.S.O., 1944.

Public Service Vehicle. In English law, vehicle carrying passengers for hire. This definition excludes a tram, trolley bus, or contract carriage for fewer than eight passengers; it includes motor coaches and buses. Public service vehicles may be express carriages (conveying passengers at separate fares, none less than 1s.); stage carriages (taking passengers at separate fares, some or all less than 1s.); or contract carriages (with passengers paying a lump sum for use of the vehicle). Taxicabs are not contract carriages, but if separate fares are charged they may become express or stage carriages. Public service vehicles are regulated in each area by traffic commissioners, and owners must annually license them. Stage and express carriages may run only on routes covered by a road service licence. Drivers and conductors of public service vehicles need special licences valid for three years, and their hours of duty are limited. All these vehicles are controlled by the Road Traffic Acts of 1930 and amending Acts.

Public Trustee. English official appointed by virtue of the Official Trustee Act, 1906, which became operative Jan. 1, 1908. He is a corporation sole whose business it is to act as executor and trustee of the estate of anyone in England who appoints him. The Act does not extend to Scotland. He can be appointed alone, or with a co-trustee or trustees, and the great advantage of so appointing him lies in the certainty that the funds

of the trust will not be frittered away, nor embezzled, nor lost in speculation, as sometimes happens with a private trustee. Investment of funds in the charge of the public trustee is limited to certain types of non-speculative security. He charges small fees, generally by way of percentage on receipts, for his services.

Public Works Administration. One of the agencies of F. D. Roosevelt's New Deal in the U.S.A. It was created under authority given him by the National Industrial Recovery Act of 1933. Its object was to expand federal and non-federal public construction, increase employment, stimulate private industry, and promote economic recovery. Harold Ickes, secretary of the interior, was appointed head of the P.W.A. and thus became responsible for the expenditure of a special congressional appropriation of \$3,300,000,000—the largest fund so far created by any nation for a peace-time purpose. In his *Back to Work*, Ickes gave an account of what the P.W.A. did in road-making, irrigation, providing cheap electric power, modernising transport, and improving public health. In 1939 the P.W.A. was absorbed in the Federal Works Agency.

Publishing. The business of multiplying literary works and distributing them to retail sellers. Printer, publisher, and bookseller were in the early days of printed books combined in one person, but the three branches have, with few exceptions, drifted widely apart. In this division the description printer stands not only for the actual printer, but for the mechanical producer of the book, which includes paper-maker, binder, and the makers of all the materials that are required for books. The printer in this fuller sense of the word is usually employed by the publisher, who is in direct relation with the author, or his agent, while the bookseller is the distributor to the public of the manufactured article produced by the printer out of the author's work for the publisher.

The publisher's functions embrace the selection of manuscripts suitable for publication, for which purpose he employs readers to supplement and correct his own judgement, and the commissioning of books on special subjects to suit the requirements of his market. The format of a book, the characters it is printed in, the thickness of the paper, its opaqueness or transparency, the proper distribu-

tion of black on white, the legibility of type, proper margins, and suitable bindings, are all considerations to which the publisher must give close attention.

Most publishing firms have special lines to which they confine themselves; only a few publish books of a certain standard in almost any field of literature. The publications of general publishers often range over history, biography, belles lettres, fiction, and poetry. Publishers of specialities often confine themselves to one such field, e.g. law, medicine, fine arts, sport, army and navy, maps.

Methods of Distribution

When a publisher has fulfilled his functions of selection and manufacture, the business of distribution begins. This is done in different ways; by travellers who visit the booksellers with samples, by creating a demand through advertisements in the public press, by means of reviews which the public expect for their guidance in the periodicals they read, and here and there by means of canvassers who sell books on the instalment plan.

Bigger sales can be secured for the general run of literature by the local efforts of booksellers who can directly reach every likely reader of a new publication, while a fashionable novelty will probably gain particular impetus through newspaper advertising, which for serious and professional literature is extravagant and uncertain. Continental publishers, however, have the burden of printing large editions in order to fill the demand for books on sale or return, which often results in heavy returns of dead stock. Expensive books and art publications are often sold by subscription, as are books printed in limited editions.

More original and often more lucrative than the issuing of submitted MSS. are publications designed by publishers themselves, the writing of which is confided to authors selected for the task. Principal among these are collective works, such as encyclopedias, which often require the employment of hundreds of collaborators, and much careful planning and organization, and also individual works planned to satisfy special interests. In this way publishers may stimulate study and render invaluable service to education. The Dictionary of National Biography; the encyclopedia publications of The Amalgamated Press, Ltd.; and the Home University and similar

libraries are instances of such enterprise. See *Bookselling*; *Illustration*; *Printing*, etc. Consult *The Truth About Publishing*, Sir S. Unwin, rev. edn., 1946.

Puccini, GIACOMO (1858-1924). Italian composer. Born at Lucca, June 22, 1858, he studied locally, and in 1877 produced a cantata, *Juno*. He worked at Milan conservatoire, 1880-83, and in 1885 his one-act opera, *Le Villi*, was produced at La Scala. His first great success was with *Manon Lescaut*, staged at Turin, 1893, and its triumph was outdone by that of *La Bohème*, founded on H. Murger's novel, 1896. His other works, the best of which are in the repertory of most great opera houses, are *La Tosca*, 1900; *Madame Butterfly*, 1904; *The Girl of the Golden West*, 1910; *La Rondine*, 1917; and *Il Tabarro*, *Suor Angelica*, and *Gianni Schicchi*, one-act operas, 1918. Puccini took the place left by Verdi as leader of the Italian operatic tradition. His most popular work is *La Bohème*, but *Manon Lescaut*, *Madame Butterfly*, and *La Tosca* closely rival it in popularity. He died Nov. 29, 1924. Turandot, which he had not finished when he died, was completed by Alfano, and produced in Turin in 1926. His letters, ed. G. Adami, appeared in Eng. trans. in 1931.



Giacomo Puccini, Italian composer

Puck or **ROBIN GOODFELLOW**. Mischievous, friendly fairy of English folklore. Puck, or a word of similar sound—Irish *puca*, Welsh *pucca*, Swedish *pojke*, Old Norse *puki*, Low German *pook*—is associated with a merry, familiar house spirit in the folklore of many peoples, and there is a curious parallel among the Red Indians of North America, for among the Algonquins *Puckwudjines* signified the little vanishing people. Puck is an important character in Shakespeare's *A Midsummer Night's Dream*, taking part as the servant of Oberon, in both the "human" plots as well as in the fairy scenes.

Puck. A disk of vulcanised rubber 1 in. thick and 3 ins. in diameter used instead of a ball in ice hockey.

Puck of Pook's Hill. Volume of stories by Rudyard Kipling, a blend of English legend and history, interspersed with verse, published in 1906. From Pook's

Hill two children are conducted by Puck through successive episodes from the days of the mythical Wayland's forge to Elizabethan times. A companion volume of stories, *Rewards and Fairies*, 1910, continued the adventures.

Pudding Lane. A London thoroughfare. It is a narrow way running S. out of Eastcheap to Lower Thames Street. The Great Fire of 1666 is said to have originated in a house in this lane. See *Great Fire*; *Pye Corner*.

Pudding Stone. Popular synonym for conglomerate (*q.v.*), a term used in geology for a rock consisting of rounded, water-worn pebbles set in a finer matrix. Hertfordshire puddingstone is the name given to a special variety of flint conglomerate.

Puddling. Name given to a process for converting cast iron into malleable or wrought iron. Invented by Henry Cort (*q.v.*) in 1784, the process consists in the removal of the carbon and silica—down to very minute proportions—and also the manganese and phosphorus and to some extent the sulphur, which cast iron always contains as impurities. The process oxidises these impurities, the carbon being converted into gas which escapes, and the silica and other elements into slags called "cinder," which are skimmed off the surface of the molten mass at the proper stage.

Puddling is carried out in a special form of reverberatory furnace, having a tall chimney to ensure a good draught. Pig iron is melted on the bed or hearth of the furnace, and when quite molten, the furnace door is opened, and the surface of the melted metal thus exposed to the air. Iron oxide is at once formed, and is worked into the mass by the puddler by means of a "rabble," an iron tool with a long handle. Additional oxide may be introduced if required in the form of magnetite or haematite, or "blue billy," a burnt iron ore. As more oxide is worked in, the mass begins to get pasty, and the puddler begins to form it into balls weighing from 60 lb. to 80 lb., which he withdraws from the furnace as he completes them. See *Casting*; *Iron*; *Metalurgy*; *Steel*; *Wrought Iron*.

Pudsey. Mun. bor. of W. Riding of Yorks, England. It is situated 3 m. E. of Bradford and 4 m. W. of Leeds, having rly. connexion with both cities. The boundaries of both are contiguous with its own. The industries include the manufacture of woollens and worsteds, iron and

brass founding, and the making of machinery. The bor. has three parish churches, S. Wilfred's, Calverley (originally 12th century, but since extensively rebuilt), S. John's, Farsley (1841), S. Lawrence's, Pudsey (built in 1821 to replace a 16th-century chapel of ease). There are also a town hall, mechanics' institute, public baths, and parks. The bor., which was incorporated in 1899, and enlarged in 1937 by the urban dists. of Farsley and Calverley, includes Fulneck, where a party of Moravians settled in 1745. It gives its name to a bor. constituency. Pudsey was the birthplace of three famous cricketers, Tunncliffe, Sutcliffe, and Hutton. Market day, Sat. Pop. est. 30,000.

Pudnkottai. Town and former state of India. The state, now merged in Madras, was surrounded by the dists. of Tanjore, Trichinopoly, and Ramnad. The rulership was given to a Tondeman chief as a reward for assistance against the French and Haidar Ali in the 18th century. The raja was assisted by an executive council composed of a diwan and two counselors. The town, centrally situated, is the only urban area of any size in the former state. Pop. 26,101.

Puebla. Inland state of Mexico. It occupies one of the highest parts of Mexico, the centre being part of the Anahuac plateau, and lies between the states of Vera Cruz on the E. and Hidalgo, Tlaxcala, Mexico, and Morelos on the W. It is drained by the Atoyac, Salado, and other streams. The soil of the river valleys is fertile, and rice, sugar, coffee, cotton, etc., are cultivated. Cattle are reared, and minerals found, but not exploited to any extent. Cotton thread, calicoes and printed goods are manufactured in considerable quantities at the capital, Puebla, and at Atlitico. The area is 13,124 sq. m. Pop. 1,294,620. *Prom.* Pway-blah.

Puebla. Third largest city of Mexico. The capital of the state of Puebla, it stands on the Atoyac river, 65 m. S.E. of Mexico City, at an alt. of 7,200 ft. In the locality are several lofty mountains, among them Orizaba and Popocatepetl. One of the oldest and finest cities of the republic, Puebla has a handsome cathedral, little inferior to that in Mexico City, a state government building, the palace of justice, a state college, an episcopal palace, the Palafoxiana library, and an academy of fine arts. The industries include ironfounding, distilling, flour-milling,

and the manufacture of cotton and woollen goods, tobacco, bricks, glass, and boots and shoes. The town is an important rly. junction having connexions with Mexico city, the port of Vera Cruz, and Oaxaca and other towns of the S. The road to Mexico city is first-class, as is that to Oaxaca. Founded in 1530, Puebla was occupied by the Americans in 1847, besieged by the French in 1862, and captured by them in 1863. It figured in the revolutionary troubles of 1914-15. Pop. 137,930.

Pueblo. City of Colorado, U.S.A. The second largest city of the state, and the co. seat of Pueblo co., it stands on Arkansas river, 122 m. S.S.E. of Denver, and is served by the Atchison, Topeka, and Santa Fe, and other rlys. The city possesses a state mineral palace, containing gigantic bronze statues of King Coal and Queen Silver. An important distributing centre, Pueblo is celebrated for its iron and steel industries, and has large smelters, foundries, and boiler works, great stockyards, and furniture and firebrick factories. The Climax mine produces 85 p.c. of the world's molybdenum. Pueblo is the market for the cattle, alfalfa, and sugar-beets produced in the great irrigated dist. which extends 250 m. along the Arkansas, and of which it is the centre. In the neighbourhood are deposits of coal and other minerals, and large oil-fields. Pueblo was founded in 1859, and became a city in 1873. Heavy loss of life and great damage to property were caused by floods in June, 1921. Pop. 52,162.

Pueblo Indians (Span., village). Term denoting various N. American Indian tribes in Arizona and New Mexico. For the former see Hopi; the latter number approx. 10,000. A pueblo usually comprises a many-chambered stone or adobe edifice of six or seven storeys, the roofs forming receding terraces. The cliff-dwelling and the Mexican *casa grande* represent early types of the pueblo culture, developed



Puebla, Mexico. Façade of the cathedral, showing the west doors and towers. See page 6752

under the economic pressure of a deficient water supply. Monogamy prevails. The women build the houses, and make the best N. American Indian pottery; the men cultivate crops and are the best N. American Indian weavers.

Their elaborate ceremonies, in underground halls (kivas), are mainly rain making rites. See American Indians; Zuni.

Pueblo Nuevo del Terrible. Industrial town of Spain, in the prov. of Cordova, 50 m. N.W. of the city of Cordova. It is the centre of an important mining region, with foundries of lead, zinc, and other metals. Pop. 17,500.

Puelche. South American Indian tribe in Central Argentina. An offshoot of the Chilean Araucanians, they intermingled with the Pampas Indians and the Patagonians, and produced various hybrid strains to which their name is loosely applied. Mostly wild, nomad horsemen, they migrated beyond the Rio Negro.

Puente del Inca (Sp., Inca bridge). Tourist centre of Argentina, about 70 m. W. of Mendoza. It is on the route of the Andean pass of Uspallata (q.v.), which is traversed by the Transandine rly. to Valparaiso. Here are a natural rock bridge and hot springs close to the great statue of Christ on the Argentine-Chilean border.

Puente Genil. Town of Spain, in the prov. of Cordova. It stands on the river Genil, 48 m. by rly. S. of Cordova, and is a junction for the rly. to Jaén. The name is derived from a bridge (Sp. *puente*) over the Genil, uniting the old, higher town with the lower. It manufactures olive oil, flour, and linen goods. Pop. 19,400.

Puerperal Fever (Lat. *puer*, child; *parere*, to bear). Form of blood poisoning due to infection by micro-organisms during or shortly after the process of childbirth. This disease was at one time very common, and was responsible for a high mortality among mothers. The use of anti-septic methods, entailing scrupulous cleanliness on the part of doctor and midwife, and thorough sterilisation of all instruments and appliances used, has reduced the incidence of the affection to a very low figure; and penicillin and the sulpha drugs have been used with good effect.

Puerperal Insanity. Name given to mental derangement associated with pregnancy or parturition. The conditions which most frequently predispose towards puerperal insanity are hereditary influences, seduction, shame, shock, and exhaustion following disease, frequent pregnancies, or prolonged lactation. The liability to insanity is greater in the first pregnancy than in succeeding ones. Four divisions are generally recognized: insanity of pregnancy, insanity of labour, insanity of the puerperium, and insanity of lactation.

Insanity of pregnancy first manifests itself about the third month, and most frequently takes the form of melancholia. Sometimes it is associated with a firm belief that the confinement will be fatal. Delusions and hallucinations may appear, and the woman may show a strong aversion to her husband. There is considerable risk of suicide in this condition.

In regard to the second division, insanity of labour, violent delirium occasionally occurs during the process of labour if the pains are severe, particularly if the woman is alone and without assistance. Recovery, as a rule, occurs rapidly after the child is born.

Insanity of the puerperium is insanity developing within the first two months after delivery. The form may be either mania or melancholia. Soon after delivery there may be acute delirium, generally passing off in a few days or weeks. Premonitory symptoms are insomnia and irritability. Hostility may be displayed towards the husband, nurse, or child. Delusions and hallucinations may be present. Suicide or injury to the child may be attempted.

The term insanity of lactation is applied when the symptoms begin from two to eighteen months after delivery. Melancholia is the most



Pueblo Indians. Left, an old hunter from New Mexico. Right, a chief from Rio Grande

frequent type, sometimes interrupted by periods of excitement. See Mental Disorder.



Puerto Cabello. Main street of the Venezuelan town

Puerperium. Period following the birth of an infant during which the mother is recovering from the effects of labour. It may be regarded as extending in normal cases over five or six weeks. During this period the uterus or womb undergoes involution, *i.e.* gradual reduction in size, and the secretion of milk in the breasts becomes established. The puerperium is a physiological state, and although the woman requires special attention and care during this time, it should not be regarded as identical with illness. The pulse after delivery is usually slower than normal, and the temperature may for a few days be raised to 100° while the flow of milk is being established. Slight disturbance may cause the temperature to rise readily to 101° or 102°, but if the rise persists for any length of time, it may be a sign of untoward developments necessitating careful examination.

The mother should keep more or less in bed until from the tenth to the fourteenth day after delivery, and thereafter should daily accustom herself to gradually increasing physical effort. See Obstetrics.

Puerto Barrios. Seaport of Guatemala, Central America. It stands on Amatique Bay, an inlet of the Caribbean Sea, and has a sheltered harbour which handles three-quarters of the country's imports. It is the terminus of the rly. which connects with the ruined city of Guatemala la Nueva, and thence to the Pacific. Pop. 26,000.

Puerto Cabello. Venezuelan seaport, in Carabobo state. It stands on the Golfo Triste, about 30 m. by rly. N. of Carabobo, and 80 m. W. of Carácas. The town is well provided with wharves and warehouses, and has a custom house, municipal buildings, etc.

It is the second greatest export centre of the country. The chief exports are coffee, cocoa, sugar, cinchona, dye-woods, rubber, cattle, and animal products. There are saw-mills, cotton mills, and cigarette factories. In 1743 it resisted the attack of a British squadron, and in 1823 the last battle in the war of independence was fought here. The fortifications were destroyed

during the Anglo-German blockade of 1902-03. Population est. 25,000.

Puerto Cortés, formerly CABALLOS. Seaport of Honduras, Central America. It stands on the Gulf of Honduras, 9 m. N.N.E. of Omoa, and is the second port of the republic. It is the terminus of the rly. to the interior and La Brea on the Pacific. The harbour, the best on the N. coast, is spacious, sheltered, and deep, and the exports include cattle, hides, bananas, coffee, cedar and mahogany, vanilla, rubber, and gold. A large trade in cattle is carried on with Mexico. Pop. est. 7,000.

Puerto de Santa Maria, EL. Seaport of Spain, in the prov. of Cadiz (known throughout Andalusia as El Puerto). It stands on the river Guadalete, at its entrance to the Bay of Cadiz, 8 m. N.E. of Cadiz, on the rly. to Seville. It has a Moorish citadel, a 13th century Gothic church, a Jesuit college, and a celebrated bull-ring. Founded by the Romans, ruined by the Arab invasion, and rebuilt in 1264 by Alphonso X of Castile, it was a rich and populous town until the beginning of the 19th century. Its main industry now is the wine trade. Sherry is exported in large quantities, and large stone warehouses, or bodegas, for the storage of the wine have been erected. Salt is also exported. Manufactures include liqueurs, brandy, soap, starch, and glass. Population 19,800.

Puerto Deseado. Seaport of Argentina. On the E. coast of Patagonia, it lies 40 m. S. of Cape Blanco and at the mouth of the Deseado river. It is the terminus of a short rly. to C. Las Heras. In 1520 it was visited by Magellan.

Puertollano. Town of Spain, in the prov. of Ciudad Real, at an altitude of 2,400 ft. It is on the

Madrid-Badajoz rly., 30 m. S.W. of the city of Ciudad Real. Puertollano owes its prosperity to important coalfields in the vicinity, worked since 1873. Pop. 23,000.

Puerto Madryn. Seaport of Argentina, in the terr. of Chubut. It stands on the Nuevo Gulf, and is the coast terminus of the rly. to Trelew, a Welsh settlement, and Gaiman.

Puerto Montt. Seaport town of Chile, capital of the prov. of Chilhoe. It stands on the Reloncavi Bay, at the head of Ancud Gulf, 60 m. direct E.N.E. of Ancud, and is connected by rly. with Valdivia, 125 m. to the N.N.W. Amid enchanting scenery, it is the base for excursions to the Chilean lakes. It has an excellent harbour, and exports timber, wheat, and leather. Pop. approx. 45,000.

Puerto Plata. Seaport town of Santo Domingo, W. Indies. It stands on the N. coast, with a sheltered harbour, and is a cable station connected with St. Thomas, Leeward Isles. It has connexion by rly. with the interior, and by steamship with the U.S.A. and Europe. Of considerable commercial importance, it exports tobacco, cocoa, coffee, bananas, dyewoods, cotton, etc. Pop. 11,777.

Puerto Principe. Former name of a province and city of Cuba now called Camaguey (*q.v.*).

Puerto Real (Port Royal). Seaport of Spain, in the prov. of Cadiz. It stands on the Bay of Cadiz, 6 m. E. of Cadiz, on the Seville-Cadiz rly. The Portus Gadetanus of Roman days, it was rebuilt 1483-88, by Ferdinand and Isabella, and is now chiefly a sea-bathing resort. It has a 16th century church and a fine town hall. The chief exports are wine, oil, and salt. Shipbuilding and repairing are engaged in. Pop. 10,400.

Puerto Rico. Island in the W. Indies, formerly called Porto Rico, and a possession of the U.S.A. The easternmost and smallest of the Greater Antilles, it lies 75 m. E. of Haiti, and measures 100 m. by 38 m. It is crossed from E. to W. by mountain ranges, on either side of which rich alluvial lands stretch down to the sea. The rivers, which flow generally N. and S. from the centre of the island, are numerous, among the principal of them being the Loiza, Arecibo, Plata, and Bayamon.



Puerto Rico arms

The elevated parts of the island are covered with fine forests of palms, sandal-wood, cedar, willow, and various fruit trees. The sugar industry produces over 700,000 metric tons annually. Much rum is made and tobacco is raised, and a high-grade coffee is shipped abroad. Pineapples and coconuts are also important exports and others are cigars, molasses, hats, fibres, and hand embroidery. Exports of fruit are increasing rapidly. Gold and other minerals exist, but are little exploited, and manufactures are undeveloped. Rly. transport facilities are almost confined to the coastal rlys., which nearly encircle the island. The capital is San Juan; other large towns being Ponce and Mayaguez. Discovered by Columbus in 1493, the island was settled by Juan Ponce de León in 1510. It remained a Spanish possession down to 1898, when it was ceded to the U.S.A. by the treaty of Paris, Dec. 10, 1898. Two years later civil government was established. An earthquake, Oct., 1918, killed over 100 persons, rendered thousands homeless, and caused damage estimated at \$800,000. Air services connect the island with the U.S.A., Central and



Juan Pueyrredón, Argentine soldier

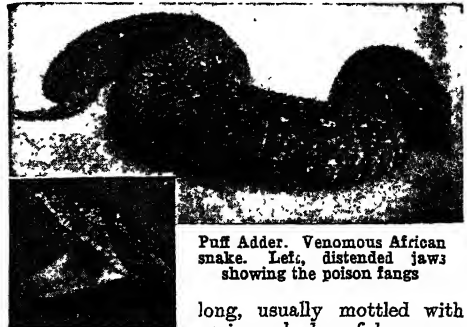
virtually brought the Argentine nation to a sense of its strength. After the founding of the United Provinces of the River Plate, 1816, Pueyrredón was proclaimed dictator, and wisely guided the young republic until 1825, living in retirement during the disturbed times that followed.

Pufendorf, SAMUEL VON (1632-94). German jurist. Born at Chernitz, Jan. 8, 1632, he was educated at Leipzig and Jena. In 1661 he made a name by his Latin work on the Elements of Universal Jurisprudence, for which he was chosen

vice-royalty of Buenos Aires, he rose to the rank of general, distinguishing himself especially in the fighting against the British during 1806-07, which

of Sweden, 1677, and in 1688 to the elector of Brandenburg. He died in Berlin, Oct. 26, 1694. Pufendorf's greatest work is his *De Jure Naturae et Gentium*, 1672, and he is also known by some historical writings and owing to his disputes with Leibniz.

Puff Adder (*Crotho arietans*). Venomous serpent, found in Africa. It is repulsive in appearance, having a very large, flattened head and thick and triangular body, 4 to 5 ft.

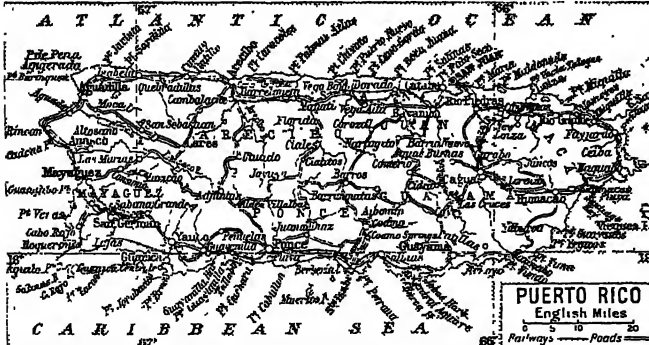


Puff Adder. Venomous African snake. Left, distended jaws showing the poison fangs

long, usually mottled with various shades of brown on the back and sides and yellowish-white beneath. When angry they draw in their breath and inflate their bodies, whence their popular name. Their venom is very virulent, and their habit of lying half-concealed in the sand and not attempting to go away when approached makes them very dangerous to unsuspecting travellers.

Puff-ball (*Lycoperdon*). Genus of fungi of the family Lycoperdaceae. The spore-bearing portion of the fungus is enclosed in a continuous wall of two layers, of which, by expansion of the inner, the outer layer breaks up into spines or warts. When the spores are ripe the inner wall opens at the apex to release them. Two common and graceful forms, covered with short spines or pointed warts, are *L. gemmatum* and *L. pyriforme*, which are edible whilst the flesh is still white. The allied giant puff-ball (*Calvatia gigantea*) also affords food before the flesh turns brown. See Fungus.

Puffin (*Fratercula arctica*). Sea bird belonging to the auk family. The plumage is black on the crown, back and wings, and white elsewhere. The bird is remarkable for its very large, adze-shaped beak, which is striped with brilliant red and orange. The decorations of the bill are shed in winter. It is found mainly on the N. shores of Great Britain, the N. temperate zone, and the Arctic, nesting in holes in the ground and crannies in the rocks, and often taking



Puerto Rico. Map of the island in the West Indies, ceded to the U.S.A. in 1898

South America, and the West Indies. The prevailing language is Spanish, but English is also spoken. Area, 3,423 sq. m. Pop. 1,869,255, about two-thirds being whites. Consult Puerto Rico and its People, T. White, 1938.

Puerto Varas. Town of Chile, in the prov. of Valdivia. Situated 120 m. S. of Valdivia, it is a centre for visiting the "Switzerland" of Chile, where there are many famous beauty spots. It stands on Lake Llanquihue and is connected by rly. with Santiago. Pop. 45,000.

Pueyrredón, JUAN MARTIN DE (1777-1850). Argentine soldier and statesman. Born in Argentina one year after the creation of the

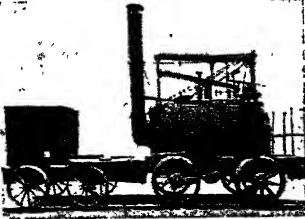
professor at Heidelberg. In 1670 he went to Lund as professor, became historiographer to the king



Puffin. Sea-bird with large brilliant-coloured beak

possession of rabbit burrows. In St. Kilda puffins are so numerous that the ground is in places honey-combed with their holes. They feed upon small fish, and can store quite a number in the large beak when collecting food for their young. In winter most of the birds migrate to the Mediterranean. See Auk; Lundy.

Puffing Billy. Name of the oldest railway locomotive in existence. Built in 1813 by Jonathan



Puffing Billy. The oldest railway engine in existence

Foster under William Hedley's patent, it was used for hauling coal trucks at Wylam colliery, Northumberland. It was the first railway engine to trust to its own weight for adherence to the track; for Trevithick's rack engine of 1804 had toothed wheels engaging with a rail. Puffing Billy is now in the Science Museum, London. See Locomotive illus. p. 5223.

Puffin Island. Islet of N. Wales. Known also as Priestholm, and by the Welsh as Ynys Seiriol (Seiriol's Island), it is off the N.E. coast of Anglesey, opposite Penmon lighthouse, and is about $\frac{1}{2}$ m. in length. Seiriol, a religious recluse of the 6th century, had a cell here. The island is famous as the resort of puffins.

Pugachev. Town of R.S.F.S.R., in the region of Saratov. Formerly known as Nikolaevsk, it is on the Irghits, and is situated 100 m. S.W. of Samara. The centre of an agricultural area, it does trade in corn and cattle. Pop. est. 13,000.

Pug Dog. Small dog of the mastiff group. It somewhat suggests a diminutive bulldog, from which it has probably been derived by a long process of degeneration. It is believed to be of Dutch origin, and was introduced into Great Britain



Pug Dog. Specimen of the toy breed

in the time of William of Orange, being known as the Dutch pug. Its skull is broad, with a very

short muzzle, the tail curls and lies close to the body, and the hair is very short and usually fawn-coloured or black. One of its essential points is a black mole on each cheek, with a tuft of hairs growing from it. The pug is probably the most indolent of all dogs and loves to be pampered, for which reason it has a great tendency to put on fat. See Dog, colour plate.

Puget, PIERRE (1622-94). French sculptor, architect, and painter. Born at Château Follet, near Marseilles, Oct. 31, 1622, he studied in Italy. He painted several pictures for his native place, but is better known by his sculpture, for which he was employed on public works by Fouquet and Colbert. His Milo of Crotona and Perseus and Andromeda were erected in the park at Versailles, and there is a Puget room in the Louvre. He died at Marseilles, Dec. 2, 1694.

Puget Sound. Irregular inlet in the N.W. of Washington, U.S.A. An arm of the Pacific Ocean, with which it communicates by Juan de Fuca Strait, it has many branches and extends for a long distance into the interior of the state. Its length is 125 m. and breadth 5 to 25 m., and it is navigable throughout. On its shores are the ports of Tacoma, at its head, Seattle, and Port Townsend.

Puggaree (Hind. *pagri*, turban). Long, light scarf formerly worn round the helmet as part of the British soldier's clothing in hot climates.

Pugilism (Lat. *pugil*, boxer; from *pugnus*, fist). Term formerly used for the now obsolete bare-knuckle fighting, sometimes applied to modern boxing (*q.v.*).

Pugin, AUGUSTUS WELBY NORTHMORE (1812-52). British architect. Born in London, March 1, 1812, he was educated at Christ's Hospital. He was employed on stage scenery and other ventures, but soon turned to architecture, and having embraced Roman Catholicism, designed many churches for that communion, including the cathedral of St. George, Southwark. When the new houses of parliament were projected, he was called upon by Barry to provide the whole of the detail drawings.

Pugin lived at Salisbury and then at Ramsgate, building in the latter town a house and a church of his own. He had a profound belief in the close connexion between Gothic architecture and Christianity, and published his critical Contrasts; or a Parallel between

the Architecture of the 15th and 19th centuries, 1836, and The True Principles of Christian Architecture, 1841. In the last year of his life he became insane through overwork, and he died at Ramsgate, Sept. 14, 1852. See Killarney. Consult Lord Shrewsbury, Pugin, and the Catholic Revival, D. Gwynn, 1946.

Pugliese Aqueduct. Engineering work in Italy. One of the largest of its kind in the world, it was completed in 1917. To carry water from the Apennines to the S., its main line goes for 133 m. from Caposele to Villa Castelli in Apulia; there it is divided. One short branch goes to Foggia, and the other to Bari, Lecce, and Taranto. Altogether the work distributes water to 536 towns and about 2,000,000 people. In the main line there are 97 tunnels, three of them more than 9 m. long.

Puisne Judge. Official of various courts of law in the English high court. On the common law side all judges except the chief justice are called *puisne* judges. The term is used in America, India, and the British dominions where the courts are constituted of a chief justice and other, inferior, judges. It is derived from old French *puisé*, younger and so inferior, from Lat. *post natus*, born after. Pron. like puny.

Pukapuka, or DANGER Is. One of the Cook Islands. It trades in citrus fruits, bananas, copra, etc., mainly with New Zealand. Pop. 660.

Pulacayo. Town of Bolivia, in the department of Potosi. It is celebrated for the Huanchaca silver mines, among the largest in America. The rly. runs to Uyuni, attaining an alt. of 13,700 ft. and giving a fine view of Andean peaks and volcanoes. Pop. 4,000.

Pulaski, CASIMIR (1748-79). Polish soldier. Born at Wincary, Podolia, March 4, 1748, he fought for Polish freedom against Russia and became commander-in-chief. The attempt to prevent a partition of Poland having failed, he migrated to America, and took part in the War of Independence with Kosciuszko and Lafayette, fighting with especial distinction at Brandywine and Germantown, and raising a corps known as the Pulaski legion. Wounded at the siege of Savannah, Oct. 9, 1779, he died two days later.



A. W. N. Pugin, British architect

Pulborough. Market town of Sussex, England. It stands on the Arun, 11 m. by rly. S.W. of Horsham. The large church, partly E.E., contains some old brasses. Corn and cattle markets are held. An old pack-horse bridge is preserved. Pop. 2,000.

Pulci, LUIGI (c. 1432-87). Italian poet. He was born at Florence, and enjoyed the patronage of Lorenzo de' Medici, on whose behalf he more than once acted as confidential ambassador. Pulci's chief work is *Il Morgante Maggior* (The Giant Morgante), 1481, a chivalrous romance, the central figure of which is rather Orlando than the giant whom he subdued. This is the first great modern example of burlesque poetry. Byron translated the first canto. *Consult* The Renaissance in Italy, J. A. Symonds, new ed. 1897-99.

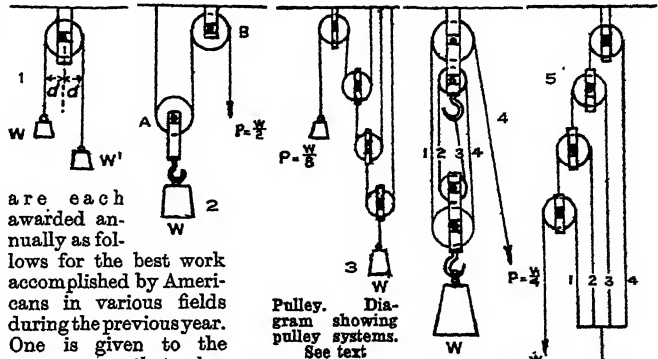
Pulex. Genus of insects including the cosmopolitan human flea, *Pulex irritans*. The adults suck blood with their piercing mouthparts. They are often found on the badger and fox in addition to man. The larvae are active, vermiform creatures about 4 mm. long when mature; they do not suck blood, but live in cracks of floors, under carpets, feeding on particles of organic matter among the dust and dirt. The punctures made by *Pulex* are irritating to most people, although some appear to be immune. Application of dilute ammonia often allays the irritation.

Pulikat. A town of Madras state, India, in the Chingleput dist. It is situated at the S. end of Pulikat Lake, a shallow coastal lagoon of brackish water connected to the Buckingham Canal. It was formerly the chief settlement of the Dutch on the Coromandel coast. It is on the coast rly. N. from Madras. Another spelling is Palghat, not to be confounded with the town of that name in the Malabar dist. Pop. 9,500.

Pulitzer, JOSEPH (1847-1911). American journalist. Of Jewish descent on his father's side, he was born at Budapest, April 10, 1847. Going to the U.S.A. in 1864, he served in the 1st New York cavalry during the Civil War. In 1876-77 he was correspondent of the New York Sun in Washington and Europe, and in 1878 he bought the St. Louis Dispatch, which he amalgamated with the Evening Post as the Post-Dispatch. He acquired in 1883 and greatly developed the New York World. He founded and endowed the school of journalism at Columbia university. In later years he

suffered from loss of sight, but retained undiminished his interest in journalism until his death on Oct. 29, 1911. The prizes for which his will provided are mentioned separately below. *Consult* Life and Letters, D. C. Seitz, 1926.

Pulitzer Prizes. Foundation established in the U.S.A. in 1918 under the will of the above Joseph Pulitzer. Twelve prizes of \$500



are each awarded annually as follows for the best work accomplished by Americans in various fields during the previous year. One is given to the newspaper that has rendered the most disinterested and meritorious public service. Others go to individuals for the most distinguished reporting, Washington or foreign correspondence, editorial writing, cartoons, and news photography. The remaining prizes recognize the most meritorious novel; play representing the educational power of the stage; book on the history of the U.S.A.; biography teaching patriotism and unselfish service; and volume of verse. There is a similar prize for the best musical composition. Awards are made by the trustees of Columbia university on the recommendation of the advisory board of its school of journalism. *See* Literary Prizes.

Pulkova. Village of N.W. Russia. It is situated on a mountain ridge 10 m. S. of Leningrad. Here was the famous observatory built by the tsar Nicholas I in 1839 and totally destroyed by German bombs in 1941. In the construction of Russian maps the meridian of Pulkova (30° 19' 40" E. of Greenwich) was formerly used.

Pullet. Name applied usually to a hen chicken in its first year. The Royal Agricultural Show committee, however, restrict its use to birds hatched in the year of the show held in June. *See* Ancona Fowl; Fowl; Poultry.

Pulley. Wheel with a flat, convex, or grooved rim, mounted on a shaft or pin upon which it is free to revolve or which is free to revolve with it. A grooved pulley

is for use with ropes or chains, the groove serving as a guide to prevent the rope from slipping off. Pulleys with wide, flat, or convex rims are used in conjunction with flat belt driving; a convex rim serves to keep the belt central on the pulley.

Fig. 1 represents a pulley secured by its block or frame to a beam, with a cord passing over it

on the ends of which weights W and W^1 are hung. As the distances d and d' are equal, by the law of the lever it follows that W and W^1 must be equal in order to balance each other. The same condition applies if the pulley be omitted and the cord passed over a fixed pin, but in practice a pulley serves to lessen friction—the larger the pulley the less the friction.

If, as in Fig. 2, one end of a cord be secured to a beam and passed round the movable pulley A and the fixed pulley B , W will require only half its weight applied at P to balance it, for W is virtually suspended by two cords, and half its weight is borne directly by the beam, whilst the pull of the other half $W/2$ passes over the pulley B . By increasing the number of movable pulleys the effort of P to balance W is decreased by one-half for every pulley; thus in Fig. 3, P and W are in equilibrium when $P = W/(2 \times 2 \times 2) = W/8$. Combinations of pulleys are known as systems. Fig. 4 indicates the second system, in which the same cord passes round all the pulleys, and in this case W is equally distributed between the four cords 1, 2, 3, and 4, from which it follows that $P = W/4$. The practical application of this system is seen in blocks and tackle. The first system is illustrated by Fig. 3, in which there is a separate



cord for each movable pulley, one end of which is secured to a beam. In the third system, shown in Fig. 5, the ends of the separate cords are all attached to the weight, the cord 2 sustains twice the weight of No. 1, the cord 3 twice that of No. 2, and the cord 4 twice that of No. 3, and $W =$ the total pull of the 4 cords, or to express it as a formula, $W = P + 2P + 2^2P + 2^3P = 15P$, whilst the reaction of the beam is given by $W + P = 16P$.

Pullman. District of Chicago, U.S.A. It was founded in 1881 by G. M. Pullman as a proprietary utopia for his employees. Charges of undemocratic town management culminated in an extensive strike in 1894. Thereupon the court ruled that the Pullman company was exceeding its charter in leasing houses to its workers, and Pullman was incorporated in the city of Chicago. Another Pullman is a city of Washington, seat of the state college for science and agriculture, 80 m. S. of Spokane.

Pullman, GEORGE MORTIMER (1831-97). American inventor. Born in Chautauqua co., N.Y., he began business first as a cabinet-maker and then as a building contractor. In 1863 he built the first Pullman sleeping-car. He carried out further improvements in railway carriages, and in 1887 invented the corridor train and introduced dining-cars. He made a large fortune, and founded the



George M. Pullman,
American inventor

model town of Pullman (*v.s.*), afterwards incorporated with Chicago. See Railways.

Pulp. Word used in a number of senses: (1) Material of which paper is made when ground up and mixed with water. (2) The soft part of any fruit, *e.g.* the pulp of an orange. (3) In mining, the pulverised ore mixed with water. (4) In dentistry, the soft sensitive tissue filling the central cavity of teeth. See Dentistry; Paper.

Pulpit (Lat. *pulpitum*, scaffold, stage, or desk). In ecclesiastical architecture, an enclosed stage or platform, raised above the level of the ground and congregation, from which the preacher delivers his sermon. Some have canopies or sounding-boards. The traditional place for the pulpit is on one side of the nave, often being built against one of the

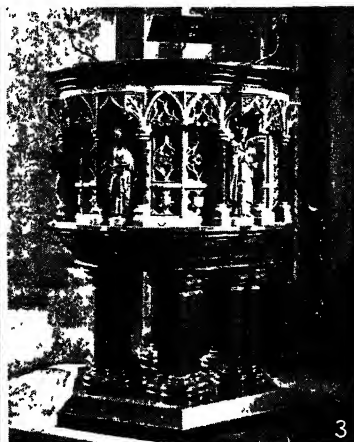
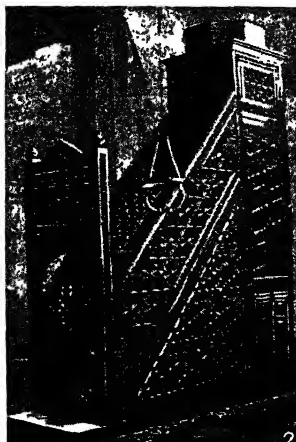
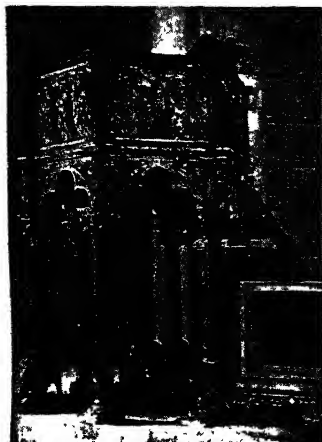
pillars dividing the nave from the north aisle; the handsomest examples, however, in point of design and carving, are independent structures. The marble pulpits of Siena cathedral and the



Pullman Cars. Exterior and interior of a modern British Pullman car, the forerunner of which was invented and built by George Pullman in 1863

Baptistery at Pisa, both sculptured by Pisano, are masterpieces. Wooden examples of the Low Countries include many splendid specimens of carving. Pulpits for preaching were occasionally erected in the open, *e.g.* the famous pulpit by Donatello attached to the wall of the cathedral at Prato. Detached open-air platforms were used in England in the 16th and 17th centuries. See Mahomedan Art; Preaching.

Pulque. Alcoholic beverage made by the natives of Mexico and Central America from the fermented juice of cacti or agaves. A favourite drink with the natives, to Europeans it has a sour, unpleasant taste.



Pulpit. 1. Hexagonal pulpit by Niccolò Pisano, 1260, Baptistery, Pisa. 2. Carved wooden pulpit, in mosque of Ala-ed-din Konieh. 3. Modern marble, St. Albans Cathedral, Herts

Pulse (Lat. *puls*, meal, pot-
tage). Collective term for peas
and beans and other leguminous
plants and seeds.

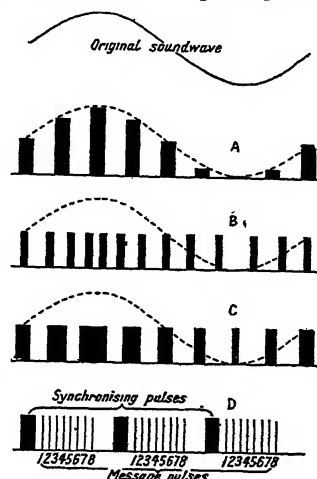
Pulse (Lat. *pulsus*, beating).
Expansion and contraction of an
artery, caused by variations in the
volume of blood propelled into the
circulation at each beat of the
heart. The pulse can be felt with
the finger in any artery lying just
beneath the skin, but is most con-
veniently examined in the radial
artery a little above the wrist.

The pulse varies in rate, strength,
regularity, and tension, and the
character of each of these attri-
butes furnishes information valu-
able in the diagnosis of certain
conditions, constitutional or in-
fectious, and of various affections
of the heart or arteries. At birth
the pulse rate is between 130 and
140 beats a minute, and this
gradually decreases during child-
hood, the rate in healthy adults
being from 70 to 80. In old
age the rate is usually from 65
to 70. The average pulse rate in
women is a little higher than that
in men of the same age. The rate
is increased by muscular effort,
fever, anaemia, and some other
diseases, and is slower than normal
in certain physical and nervous
disorders. A very common cause of
irregularity in the pulse is ex-
cessive smoking. *See* Anatomy;
Artery; Blood.

Pulse Modulation. Method of
radio transmission. Radio tele-
phony is accomplished by the
modulation of a carrier wave. In
ordinary broadcasting and in the
trans-Atlantic telephone service,
the carrier is a series of continuous
waves; modulation consists in
causing the transmitted sound
waves to effect alterations, cor-
responding to their frequency,
intensity, and duration in either
the amplitude (amplitude modula-
tion) or the frequency (frequency
modulation) of the continuous-
wave carrier. During the Second
Great War a new technique was
developed. In this the carrier
consists of brief, recurrent bursts
of radiation called pulses. Be-
tween pulses the transmitter is
quiescent; for the duration of
each pulse it transmits at full
power. A pulse transmission may
be modulated by the sound waves
in different ways.

In the diagram (a) is indicated
how pulse amplitude modulation
"spells out" the message by a
variation of the energy conveyed
by individual pulses. Pulse fre-
quency modulation is illustrated
at (b) and pulse width modulation

(or pulse duration modulation) at
(c). There are other possible
methods of pulse modulation. A
practical application is illustrated
at (d). A British army wireless
equipment developed during the
war could send eight separate



Pulse Modulation. Diagram showing
various methods of pulse modulation.
See text

messages simultaneously on the
same wavelength. The ampli-
tude-modulated pulses numbered
1 after each synchronising pulse
conveyed the first message; those
numbered 2, the second message;
and so on. The receiver was so
arranged that each section of it
responded only to those pulses
which occurred a definite fraction
of a second after each synchronis-
ing signal. Each message was thus
automatically sorted out from
the others.

Pulse transmission may be
applied to ordinary broadcasting.
It can be carried
out only on the
very short waves
(very high fre-
quencies); but
such wavelengths
have come in-
creasingly into
use. It has be-
come possible to
broadcast 8 or 10
different pro-
grammes simulta-
neously from one
pulse-modulated
transmitter. The
listener can then
take his choice
without altering
the tuning, by
merely pressing a
numbered button
in the receiver.

Pultusk. Town of Poland. It
stands on the Narew, in the co.,
and 35 m. N., of Warsaw. Its
trade and industries are unim-
portant. The ancient castle was
formerly a residence of the bishop
of Plock. Pultusk was the scene
of the victory of Charles XII of
Sweden over the Saxons in 1703,
and of the French over the Rus-
sians, Dec. 26, 1806. Population
(estimated) 20,000.

Pulverised Fuel. Fuel used
in industrial processes. Boilers
using it require a pulverising plant
to reduce the solid fuel to a fine
powder. Nozzles are provided,
through which the powdered fuel
is blown, mixed with air, having
a high degree of turbulence.
Partial combustion occurs, re-
sulting in an intensely luminous
flame, radiating heat to banks of
tubes enclosing the combustion
space, and is completed by a
secondary air supply. Preheating
the air supply by means of the
waste gases reduces the amount
of air required. Fuels with a high
ash content are not satisfactory,
since there is a deposit of fine
dust or fused ash on the water-
cooled surfaces which impairs
their efficiency. The disposal of
the dust also presents a difficult
problem. Pulverising plant may
consist of a bin and feeder system,
in which a single pulveriser is
used for a number of boilers, or
a separate pulveriser for each
boiler, usually of the ball and
roller type, with direct feed to the
boiler. Preliminary heating is
usually necessary in order to
reduce the amount of moisture.
See Combustion; Fuel.

Puma (*Felis concolor*). Large
carnivorous mammal of the cat
family, widely distributed through



Puma. Male and female of *Felis concolor*, a large
American member of the cat tribe
Gambier Bolton, F.Z.S.

N. and S. America. It is easily recognized by its size, the body being nearly four feet long, and its uniform and unspotted tawny colour. Young animals are profusely spotted with black and have ringed tails, but they assume the colour of their parents when about six months old. There are several local varieties.

In N. America the puma is commonly known as the mountain lion or the panther, while in S. America it is called the lion or cougar. Native Indians call it "the friend of the Christian," on account of its harmlessness to man and its tendency to accompany him—apparently out of curiosity. But it is a dangerous foe to horses, cattle, deer, and dogs, and does great damage in the neighbourhood of farms and cattle ranches. In the forest regions it preys chiefly on monkeys and rodents. It usually spends the day in sleep, and roams

by night in search of prey, which it kills by leaping on their backs and breaking their necks. A puma has been known to clear nearly 40 ft. in a horizontal leap and 20 ft. in a vertical one. It makes its lair in cavities in the rocks, and usually produces from two to four cubs in a litter. In captivity it is usually gentle and easily tamed.

Pumice or Pumice Stone. An effusive igneous rock possessing a spongy texture. Grey in colour, it has been formed by the expansion of occluded gases when the molten rock reaches the surface. Pumice stone is characteristic of lavas of rhyolitic composition, and is extensively used as a polishing, smoothing, and cleaning stone. Ground to a powder and mixed with soaps, it forms a constituent of many metal polishes.

The finest pumice stone is obtained from the Lipari Islands. See Rhyolite.

PUMP AND PUMPING MACHINERY

John G. Day, A.M.I.Mech.E.

The scientific basis of pumping and the principal types of pumps in common use are here described. Further relevant information appears under Air-Pump; Compressed Air; Hydraulics; Vacuum; Water Supply, etc.

A pump may be defined as a machine for moving and elevating liquids. Fig. 1 illustrates graphically some of the principal terms used in pumping. Total static head is the vertical height through which the liquid has to be raised, total pump head is the total static

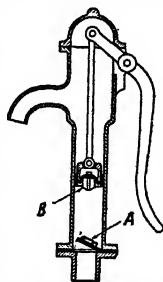
head plus friction loss and velocity head. Friction loss is the loss of energy due to friction set up between the water and the inside surface of the pipe. It varies approx. as the square of the velocity of water in the pipe, with the roughness of the surface of the

pipe, and with its length. Other factors which increase friction losses are sudden changes in direction, due to sharp bends, sudden changes in diam., and obstructions created in pipes by certain types of valve. Energy thus has to be imparted by the pump to overcome friction; this additional head is frequently expressed as friction head. Velocity head represents the head in ft. due to the velocity of water in the pipe; it is usually extremely small and can be neglected in calculations.

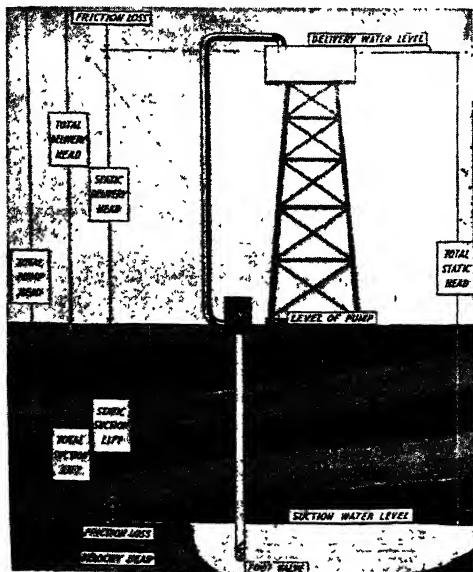
The total delivery head against which a pump will work depends solely on the power exerted by the pump, but the suction lift is limited by the pressure of the atmosphere. This latter pressure will support a column of water approx. 34 ft. high and it therefore follows that theoretically the maximum height to which water can be lifted by creating a perfect vacuum in the suction pipe is 34 ft. When due allowance is made for friction loss, velocity head, etc., and the practical impossibility of forming a perfect vacuum, a maximum suction lift of about 25 ft. is usually taken, and it is advisable to reduce this still further if possible. This applies to cold water only. For liquids other than water, suction lift is affected by the specific gravity and viscosity of the liquid. For pumping hot liquids, and in particular hot water, as in boiler feeding where the feed water temp. is high, the vapour given off by the liquid counteracts the atmospheric pressure on the surface of the liquid. It may even be necessary for the hot liquid to flow by gravity to the pump, that is, to have a positive head on the suction.

The chief classes of pump, according to their working principles, are:

(a) *Reciprocating Pumps.* These may be subdivided into (i) lift or suction pumps; (ii) lift-and-force pumps. The principle of the lift pump is illustrated in Fig. 2, which shows a simple hand pump, the most common form of lift pump. When the bucket B is raised a partial vacuum is formed below the bucket, causing the water to rise through the suction pipe, lifting foot valve A, and entering the barrel. During the down stroke the water is trapped by the closing of A and is forced through the valve in B, and eventually up through the delivery. The column of water below B is prevented from falling by atmospheric pressure acting on the level of water on the outside of the suction pipe. On the next up stroke of the bucket the water above B is carried upwards, and simultaneously more



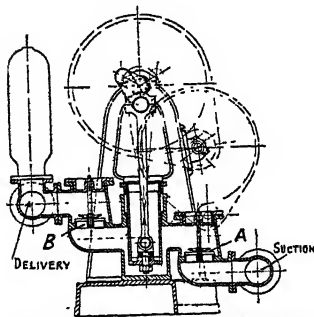
Pump. Fig. 2. Diagram illustrating the principle of the lift pump. See text



Pump. Fig. 1. Illustrating some of the principal terms used in pumping

water is drawn into the barrel through A. This type of pump is single acting and discharges water on the up stroke of the bucket only. Theoretically, the quantity of water delivered during each up stroke is the volume displaced by the bucket, but in practice it is slightly less owing to a certain amount of "slip" past the valves and bucket. The ratio of the actual to the theoretical quantity is called the volumetric efficiency of the pump; in a good pump it is about 95 p.c.

Fig. 3 shows a single acting lift-and-force pump. The delivery valve B is in a separate chamber and not attached to the plunger. The plunger draws in water during the up stroke and forces it out through B during the down stroke. The delivery head against which

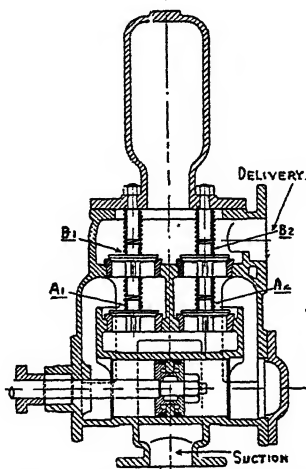


Pump. Fig. 3. Section of single acting lift-and-force pump. See text

the pump will work is limited only by the power exerted on the plunger during the down stroke, and by the strength of the pump casing to withstand the internal pressure due to the liquid. The solid plunger working through a watertight gland frequently replaces the bucket, particularly in pumps working under very high pressure, e.g. pumps for hydraulic presses.

Fig. 4 shows a double acting pump which delivers on both the in and the out stroke of the piston. There are thus two suction valves A1 and A2, and two delivery valves B1 and B2, A1 working simultaneously with B2, and A2 with B1. The delivery side of the pump is fitted with an air chamber, the function of this being to relieve the pump and pipes of sudden shocks, by virtue of the compressibility of the air in the upper part of the chamber. The air chamber also produces a more even flow in the delivery pipe and its use is absolutely imperative in the case of high pressure pumps.

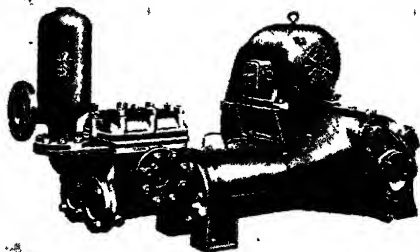
The design of valve fitted to a reciprocating pump depends on the type of pump and the liquid



Pump. Fig. 4. Section of double acting pump. See text

being dealt with. The hinged flap valve is common in smaller pumps. Metal wing guided valves, conical and mushroom valves, and valves with rubber sealing disks are in wide use. For viscous liquids, ball valves may be preferable. Whatever the design of valve an ample area is necessary to allow the liquid to pass without raising the valve far from its seat. Wear increases rapidly with the lift of the valve, and a slow-closing valve results in loss of volumetric efficiency.

The reciprocating pump can be arranged for drive by steam engine, petrol and oil engine, and electric motor. To give a more even flow and turning moment and for other practical considerations, multi-barrel pumps are frequently used, common types being duplex (quad-ruple acting) bucket pumps and triplex single acting ram pumps. Fig. 5 illustrates a general purpose electrically driven duplex pump.



Pump. Fig. 5. A general purpose electrically driven duplex pump

The motor is situated on top of the crank case and the drive to the pump is taken through compound gearing, the whole of the motion work being totally enclosed in the crank case and automatically lubricated. This type of pump is used in mines, as is the horizontal triplex single acting pump. Some of the famous early steam engines of Newcomen and Watt were in actual fact steam driven reciprocating pumps, the engine driving the pump through a beam arrangement. Driving a pump thus formed one of the first practical uses of steam power. There are many fine installations of large vertical triplex ram pumps driven by triple expansion steam engines in water-works. In gas works, and where process steam is available, the direct acting steam driven simplex and duplex double acting pump is used for pumping tar, ammoniacal liquor, etc. The pumps used in conjunction with Pluto (q.v.) in 1944 were of the horizontal triplex ram type and could pump against pressures of 600 lb. per sq. in. Fig. 6 illustrates one of these pumps, which were petrol engine driven.

Special designs of reciprocating pumps are made for dealing with pitch at high temps., concrete, sewage, molasses, volatile substances, etc. In the Diesel engine

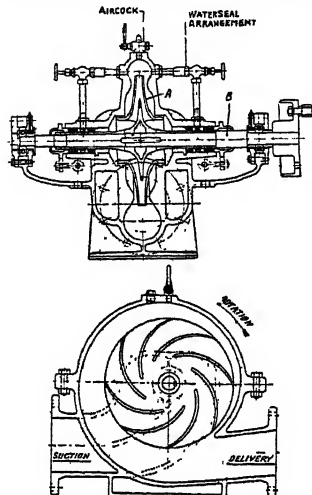


Pump. Fig. 6. Horizontal triplex ram type

the fuel is supplied and regulated accurately by a small plunger pump driven from the engine. As the time allowed for the injection of this exceedingly small quantity of oil is less than $\frac{1}{1000}$ sec., the efficiency of the engine depends upon the proper design and timing of these pumps. The pumps frequently have to deliver against pressures of 10,000 lb. per sq. in.

(b) *Centrifugal Pumps.* This type of pump has no valves or buckets, the main parts being an impeller

rotating in a volute casing. Fig. 7 shows a section of a typical centrifugal pump. The impeller A is mounted on a shaft B, and is open at the centre and divided into a number of compartments by vanes. These vanes are curved backwards from the direction of rotation. The centrifugal force produced by the rapid rotation of



Pump. Fig. 7. Section of a typical centrifugal pump. See text

the impeller forces the liquid out from the eye of the impeller to its periphery, thus creating a vacuum at the eye. This in turn induces the water to flow up the suction pipe and into the pump. On leaving the vanes the water enters the volute casing, which is so shaped that its area increases towards the delivery. The kinetic energy thus imparted to the water by the impeller is converted into pressure energy as the velocity is reduced till it reaches the delivery pipe. When the pressure becomes more than sufficient to balance the delivery head, flow takes place up the delivery pipe. The design illustrated is made in a standard range for quantities up to 3,500 galls. per min. and heads up to 200 ft., the figures referring to a rotational speed of 1,450 r.p.m. Efficiencies of over 85 p.c. are common. Many centrifugal pumps being designed to run at a rotational speed of 2,900 r.p.m., this type of pump is very suitable for direct drive from electric motor, oil or petrol engine, or steam turbine.

A very popular design of centrifugal pump for small installations is the self-contained motor pump (Fig. 8). Here the impeller is

mounted on an extension to the motor shaft, and the volute casing is bolted to the motor frame.



Pump. Fig. 8. A popular design of a centrifugal pump

Fig. 9 illustrates a very large pump, a motor car being shown in the delivery connexion to give some idea of the size. Three of these 102 in. pumps were supplied to the Middle Level Drainage Commissioners and installed at St. Germans, Norfolk, the capacity



Pump. Fig. 9. A very large pump with a capacity of 1,000 tons of water per min.

of each pump being 1,000 tons of water per min.

For very high heads, multi-stage pumps are used. These have several impellers mounted on a common shaft, and the liquid passes from one to the other through specially shaped passages, gaining pressure at every stage. The number of stages is rarely more than ten, and designs for heads up to 2,000 ft. are fairly common. Typical applications are boiler feeding, colliery drainage, water supply, hydraulic service. The multi-stage pump is made vertically for use in boreholes, the motor being fixed at the top. In the submersible borehole pump the transmission shaft is eliminated entirely, the motor driving the pump being made submersible and built as a unit with the pump, the complete unit suspended by a rising main from the well head, and cables led from the motor to the starter at ground level.

Special uses of the centrifugal pump, which has a very wide range of application, include dewatering and impounding of docks, sewage installations, dredging, dewatering of mines, marine work, waterworks, boiler feeding, hot oil pumping in refineries, irrigation, hydraulic pressure services. Fire-fighting units use a centrifugal pump driven by petrol or oil.

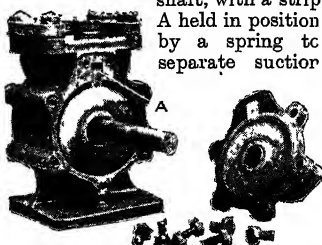
(c) *Rotary Pumps.* These are of the positive displacement type, usually without valves, and are compact. Constructed in many different designs, they are used chiefly for dealing with liquids, e.g. spirits, oils, beer, wines, petroleum products, thin tar, lard, which have a lubricative action and are free from grit, etc. Other uses are for circulating cooling water in internal combustion engine jackets, lubrication systems, operating hydraulic and machine tools, and for presses, cranes, and variable speed gears.

Fig. 10 shows a simple gear pump, probably the most common type. It consists of two toothed wheels mounted on parallel shafts and revolving in



Pump. Fig. 10. Common type of a simple gear pump

a surrounding casing bored to accommodate the rotors, and having inlet and outlet connexions cast integral. The spindle of one of the gear wheels is extended to form the driving shaft. Another type (Fig. 11) has rotors bored to fit loosely on eccentrics turned on the driving shaft, with a strip A held in position by a spring to separate suction



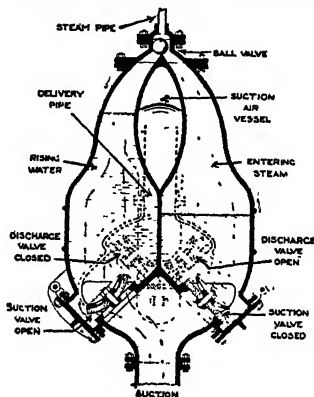
Pump. Fig. 11. A type of rotary pump. See text

from delivery. Other types have radial pistons operated by an eccentric on the rotating shaft, and are sometimes equipped with automatic stroke control.

(d) *Pumps Operated by Gas or Vapour.* Pumping liquids by means of compressed air, as in

the air lift, is a comparatively simple method and consists of forcing air into the open end of a rising main deeply submerged in the liquid (see Fig. 12). The air impregnates the liquid and reduces its density, with the result that the weight of a column of liquid and air inside the rising main is less than the weight of an equal column surrounding the rising main. The air escapes as large bubbles which form a succession of elastic pistons and push plugs of liquid upwards in front of them, the total volume of liquid in the delivery pipe at any instant being less than would be required to fill to the liquid level. The efficiency falls as the ratio of AB to BC increases, since a larger quantity

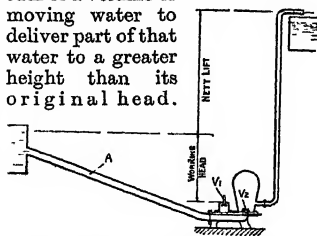
it forces the water in that chamber through the delivery valve and into the delivery pipe. When the



Pump. Fig. 13. Section of Pulsometer steam pump. See text

level of water in this chamber has fallen to a certain point, steam escapes in the delivery pipe and condensation begins. This condensation moves the ball over, closing the chamber, and the partial vacuum thus formed causes water to be drawn through the suction valve and into this chamber. Whilst this is going on, steam is entering the other chamber and expelling water from it until the condensation level is reached, when it starts to draw in more water. The Pulsometer steam pump is the modern counterpart of Savery's water-raising engine, the Miner's Friend, first patented in 1698, and works on exactly the same principle.

The hydraulic ram is an extremely simple and cheap device for raising water to a considerable height for domestic and industrial purposes and utilises the momentum of a volume of moving water to deliver part of that water to a greater height than its original head.



Pump. Fig. 14. Pump working on hydraulic ram principle. See text

Water falls through the drive pipe A (Fig. 14), the supply being taken from e.g. a stream, into a ram chamber wherein is a waste valve V1.

A delivery valve V2 is kept closed while V1 is open by the

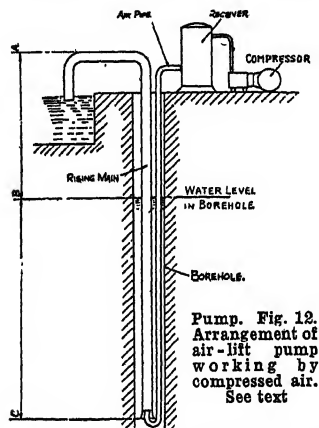
greater pressure of water in the delivery pipe. When the velocity of water escaping through V1 reaches a certain figure, V1 is suddenly forced against its seating and the trapped water opens V2 and flows up the delivery pipe until its momentum is destroyed, when V2 closes and V1 opens, and the cycle starts again. The hydraulic ram will work with a fall of a very few ft. and will work for very long periods with little or no attention.

In addition, there are mechanical lifters, such as chains or buckets, which dip into the liquid. The pumps described are designed to deal with liquids, but many of them differ only in detail from pumps used for air or gases.

J. G. Day

PUMPS IN THE PETROLEUM INDUSTRY. These are used for two purposes: (1) moving oil through pipe lines, emptying and filling tanks, etc., and (2) lifting oil in the well. Those used for (1) are usually types of centrifugal and reciprocating pumps, size and design depending on their duty, and are driven by steam, internal combustion engine, or electric power. Most oil well pumps are either gas lift—similar to air lift but using natural gas in place of air—or simple plunger pumps operated from the surface by rods. Gas lift is advantageous in deep wells, and where mechanical pumping is difficult, but it is unsatisfactory where production is less than 100 barrels per day. The rod-operated plunger pump is screwed to the bottom of a pipe suspended in the well. It uses simple steel ball valves, and a steel plunger or piston is moved in the body of the pump by rods which protrude through a stuffing box on the pipe at the top of the well. Oscillation of rods is generally by a pivoted beam (walking beam) driven by a gas engine or electric motor. Sometimes, by means of pull rods and cranks, several wells are pumped by one engine. Pumps vary from 2 to 4 ins. in diam. and from 5 to 20 ft. in length, the stroke varies from 18 ins. to 10 ft. and speed is from 12 to 40 strokes per min. An electrically driven centrifugal pump which operates submerged at the bottom of the well is also made. The smallest size works inside a 6½-in. pipe.

Pumpnickel. German bread made of coarse, unbolted rye. It is very heavy and of doughy consistency, with a hard outer crust, and is somewhat acid in taste. Sometimes



Pump. Fig. 12. Arrangement of air-lift pump working by compressed air. See text

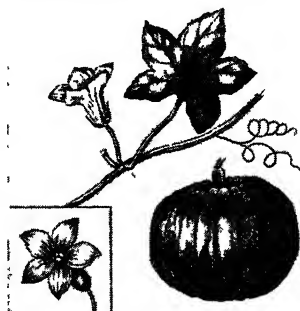
of air is required to aerate a given quantity of the liquid.

The Humphrey gas pump, in which an elastic fluid is used to expel the water, is actually a four stroke internal combustion engine of which the pump barrel is the cylinder, and a column of water continually added to at the suction end, and subtracted from at the delivery end, is the piston. A set of five of these pumps was installed at the Chingford reservoir of the Metropolitan Water Board, each pump capable of delivering 40 million galls. per day against a head of 30 ft.

In the Pulsometer steam pump (Fig. 13) the water is forced up by the direct action of steam. The pump consists of two bottle shaped chambers meeting at the top where steam enters one or the other, depending upon the position of a ball valve which is so arranged that it can close either of the chambers. Each chamber has a suction valve and a delivery valve. When steam enters one chamber

a glazing flavoured with caraway seeds is given to this bread, which was largely made in Westphalia.

Pumpkin (*Cucurbita pepo*). Trailing and climbing annual herb of the family Cucurbitaceae. Its



Pumpkin. Fruit, and stalk with male flower, leaf, and tendril; inset, female flower

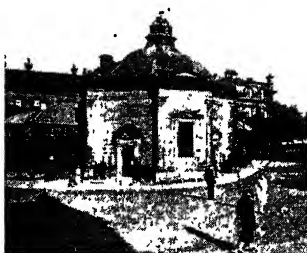
native country is unknown. As a cultivated plant it was introduced to England from the Levant about 1570. The bristly, succulent stems bear five-lobed leaves and strong spiral tendrils by means of which it climbs bushes. The large yellow flowers are unisexual, though both male and female grow on the same plant. The females are distinguishable at sight from the presence of the ovary below the calyx. This develops into the enormous fruit or gourd pumpkin, sometimes weighing over 20 lb. The vegetable marrow and the squash are cultivated varieties of this species. Though not so popular as the marrow, the pumpkin can be cooked in a variety of ways, the best known of which is pumpkin pie. It is easily grown from seeds sown in spring in a gentle heat, and the young plants are set out of doors when there is no danger of night frosts. They succeed in most soils, but do best above a heap of well-covered manure; they require an abundance of water when fruiting. See Gourd; Vegetable Marrow.

Pump Room. Room in the buildings attached to a mineral spring, where the waters are drunk by persons undergoing a cure. The most famous place of the kind in England is the pump room at Bath, which, under the autocratic rule of Richard Nash, was made the capital of the province of pleasure for the fashionable world from about 1706 until his death in 1761. Tunbridge Wells and Scarborough were rather repaired to for relief, though in the time of Charles II the former was a frequent resort of the court. Aix-les-Bains, Baden, and Homburg are Continental

spas famous for their pump rooms. See Nash, Richard; Spa.

Pun. Play upon the similarity of sound in words of different significance. The word is supposed to derive from the A.S. *punian*, to pound or bruise, and thence to indicate a pounding of words into a new sense. At its best the pun is rare wit, sharpening and clinching the thought to which it owes its being. When a French Revolutionary, being carried to the scaffold, regretted that he had not finished writing a play, Danton said, "Tu feras assez de vers"—you will make enough verses (or worms).

Apart from the happy conversational puns of scores of quick-witted people, the greatest examples in English are those of Thomas Hood. When he had been ill crossing the Channel, Hood declared that a "sick transit" had destroyed the "glory o' Monday." In his writing, including poetry, the pun achieved an acknowledged position as a literary form, often with moving effect. Other users of the pun as an aid more especially to conversational wit were Lamb—who Hazlitt said always made the best pun of the evening—Sydney Smith, Douglas Jerrold, and O. W. Holmes. With the mere word torturing which passed for punning in the burlesques and pantomimes of the later 19th century the pun fell into discredit. Consult Addison's essay in *The Spectator* (No. 61) for the history of the pun, and Birch's letter in *The Guardian* (No. 36) for its apology.



Pump Room. Exterior of the Royal Pump Room, Harrogate, and below, interior of the world-famous Pump Room, Bath



Puna. High Andean plateaux stretching from Colombia to Chile. Being bounded by the higher rims of the Andean chains they resemble vast troughs. Their great elevation gives them a cold, bleak climate which, together with the little precipitation, restricts the natural vegetation to poor tuft grass and other low plants. On the lower punas, however, the conditions resemble those of the world's poorer grasslands, and pastoral occupations can be pursued. The name is also given to the cold, dry wind on these plateaux. See Andes.

Punakha. Chief town of the independent state of Bhutan, India. It is situated on the E. edge of the Himalayas on the Sankosh, a small tributary of the Brahmaputra, and has a fortress of great natural strength.

Punan. Indigenous tribes of Indonesian stock in Sarawak and central Borneo. Estimated at 100,000, round-headed, pale-yellow, muscular, they are inoffensive jungle nomads, wear bark waistcloths, occupy rude leaf shelters, and subsist on wild sago, fruits, and game hunted with blow-gun and poisoned darts.

Punch. Alcoholic beverage made of spirits and fruit juice, spice, sugar, and hot water. The name and the drink were originally Indian, *panch* being Hindi for five—the five essential ingredients including arrack and tea. According to the spirit used, punch is called rum, brandy, or whisky punch. Wine or even ale is sometimes added. Milk punch is made of milk and rum, generally bottled, and drunk cold.

Punch. Steel tool for forming holes in thin metal or for marking a point on metal, usually for starting a drill. Punches may be used with a hammer or mechanically operated. In fine precision work an automatic centre punch is employed, the blow being applied by a spring mechanism inside the handle. Typical manual examples are pin punches for driving out dowel pins and nail punches for sinking nailheads below the surface of the wood. A bell-centre punch, which slides inside a bell-shaped base-block, marks the centre of the end of a shaft for work on the lathe; a dinking punch cuts washers from leather; a rivet punch, which has a hollow cupped head, finishes off rivet heads. Power-operated punches can run holes through several inches of steelplate.

Punch OR THE LONDON CHARI-VARI. British illustrated weekly journal. Devoted to social and

political satire, humour, and literary and dramatic criticism, its first issue was published June 17,



Punch. Replica of the first issue of Doyle's cover, Jan. 6, 1849
By courtesy of the proprietors of "Punch"

1841. Ebenezer Landells, Henry Mayhew, Mark Lemon, and Stirling Coyne were chiefly concerned with its production, and for a short time the three last named were joint editors. Then Mark Lemon became chief editor, remaining so until his death in 1870. Succeeding editors have been Shirley Brooks, 1870; Tom Taylor, 1874; Sir F. C. Burnand, 1880; Sir Owen Seaman, 1906; E. V. Knox, 1932; C. K. Bird (Fougasse), 1949.

Punch became in 1842 the property of Bradbury & Evans, a firm known since 1872 as Bradbury, Agnew & Co. The original cover was the work of A. S. Henning; second by Hablot K. Browne (Phiz), Jan., 1842; third by W. Harvey, July, 1842; fourth by Sir John Gilbert, Jan., 1843; fifth by Kenny Meadows; sixth by Richard Doyle, Jan., 1844; and the seventh and present cover, by Richard Doyle, Jan., 1849. The original price of 3d. was maintained until 1917, when the extra cost of materials due to the First Great War forced it up to 6d. The Punch Almanack, a special Christmas number, first issued 1842, was later supplemented by an annual summer number.

Punch has been banned more than once in Russia, Germany, and France; but on the whole, while pricking bubbles, it has reflected week by week the best and most representative feeling of the nation, as well as its follies and foibles, and many a good cause has found in it a helpful friend. Reprints in various forms, e.g. Pictures from Punch, 4 vols., 1906;

the Punch Library of Humour, ed. by J. A. Hammerton, 25 vols., 1907, Mr. Punch's History of Modern England, by C. L. Graves, 4 vols., 1921-22; and the New Punch Library, ed. Sir John Hammerton, 20 vols., 1933, bear witness to its permanent appeal. British art and letters are equally well represented in its pages, and scholarship has given an edge to its wholesome fun. Numbers of its cartoons, like Leech's General Février turned Traitor, 1855; Tenniel's Dropping the Pilot (Bismarck), 1889; and Partridge's King Albert (Unconquerable), 1914, have become historic. Much of its verse, as Hood's Song of the Shirt, 1843, and Tom Taylor's Abraham Lincoln, 1865, are permanent additions to English literature; and numbers of its jokes, as Advice to persons about to marry—Don't! or the frugal Scot's Bang went Saxpence 1, or the curate's egg that was excellent in parts, have passed into proverbs.

Among the many brilliant writers and artists who have sat round



Punch and Judy. The famous old puppet play, still a popular entertainment with children. Right, Judy attempts to rescue their baby from the violence of Punch

the staff table at the weekly dinners, in addition to those named already, are the à Becketts, F. Anstey (Guthrie), Alfred "Crowquill," Harry Furniss, Douglas Jerrold, R. C. Lehmann, Percival Leigh, Charles Keene, E. V. Lucas, Henry Lucy (who, as Toby, M.P., contributed Essence of Parliament for over 30 years), George du Maurier, Phil May, A. A. Milne, L. Raven-Hill, E. T. Reed,

Frank Reynolds, Linley Sambourne, Ernest Shepard, Claude Shepperson, W. M. Thackeray, and F. H. Townsend. See Charivari; Keene, C.; Omnibus; consult also The History of Punch, M. H. Spielmann, 1895.

Punch and Judy. Name of an English puppet play, performed in the open by itinerant entertainers. The performer is concealed in a portable frame covered with cloth, the upper part of which is open in front, forming a small covered stage. The puppets are moved from below by the hands of the performer, who utters the dialogue in a nasal falsetto, varied to suit the characters. There have been various forms of the play, but the hero, Punch, is always a violent, pugnacious, but droll and high-spirited rascal, hunch-backed, hook-nosed, and gaily dressed, who



with the help of a stout cudgel overcomes all his enemies in succession. In one version, Punch, having murdered his child and his wife, Judy, flies from an officer of the law, escapes from the Spanish Inquisition, and repels various antagonists, including Disease, Death, and the Devil. Punch is commonly accompanied by a small live dog, Toby.

Punch, originally called Punchinello, appears to have been introduced to England from France at the Restoration, but did not gain great popularity until the reign of William III, when the show may have been modified by the influence of Dutch puppet plays. Addison devotes an article in The Spectator (No. 14) to the play. Judy is a familiar form of the once common name Judith, and Toby, as a dog's name, is due to the dog of Tobias in the Book of Tobit. See Marionettes; Punchinello; Puppets. Consult Punch and Judy, J. P. Collier, illus. G. Cruikshank, 5th ed. 1870.

PuncHESTOWN. Racecourse in co. Kildare, Eire. In the parish of Rathmore, it is 2 m. from Naas and 24 m. S.W. of Dublin, with a rly. station. It is noted for its steeplechases, especially the meeting of the Kildare Hunt in April.

Punchinello. Older form of the name Punch in the Punch and Judy show. It is adapted, probably,



Punchinello, as he appeared on the old Italian stage

through the influence of the old word *punch*, short and fat, from Fr. *Polichinelle* or Ital. *Policinella*, more commonly *Pulcinella*. This character appears in the Italian Commedia dell'Arte (*q.v.*) about the beginning of the 17th century, and originated in the neighbourhood of Naples. Traditionally represented with a black mask and a hooked nose, he is a boastful country clown, the hero of ridiculous and rascally exploits, and not devoid of wit. *Pulcinella* apparently means little chicken, though the origin of the name has been much debated. The character was soon transferred from the theatre to the puppet show, and in this form was adopted by the French, who made him dwarfish and lurch-backed, and the mouth-piece of much rillery and satire. The English Punchinello, whose rôle was long much less restricted than that of the conventionalised Punch, resembles his French original in his unflinching impudence and hilarity.

Punctuation (Lat. *punctum*, point). Method of dividing written words by a system of conventional marks, called points or stops, into sentences and clauses. It is done for the quicker apprehension of their meaning by the eye, and the avoidance of misunderstanding of their purport, and as a guide to intonation in reading aloud. Aldus and Paulus Manutius (*q.v.*), the 16th century printer-publishers of Venice, were the first to introduce systematised punctuation into printed books, and the advantages of the device speedily conquered the world. In non-inflectional languages, such as English, where position chiefly determines the relation of words, long sentences would be almost unintelligible without some such assistance.

Four principal marks are in use: the full point, or period (.), marking the end of a sentence; the colon (:), marking a shorter pause, properly placed where the sense is continued independently of

grammatical construction, and best employed only to introduce a formal statement; the semi-colon (;), denoting a still shorter pause and separating the conjunct members of a sentence; and the comma (,) marking the shortest division of a sentence and indicating the shortest pause in reading aloud. In addition, the notes of interrogation (?) and of exclamation (!) indicate a question and admiration or surprise respectively. Quotation marks (" ") often called "inverted commas," mark the beginning and end of a quotation or passage of dialogue in narrative; and the dash (—) is used to suggest hesitation, or to introduce a word or thought supplementary to something said just previously.

Pedants have raised punctuation to the dignity of a mystery. Theoretical rules for its application are of little use. Common-sense, reinforced by the ear, is the best guide for the writer; while printers generally follow rules laid down in their respective establishments. See Colon; Comma, etc.

Pundit OR **PANDIT** (Hindi, learned man). Designation of teachers, especially of Sanskrit and Hindu scholars. The term is also applied to skilled native topographical surveyors, some of the earliest having been schoolmasters. In the old supreme court of India the Hindu adviser of the British judges was called the pundit.

Pungue. River in Mozambique, E. Africa, rising in the Inyanga range in Mashonaland, Rhodesia, and falling into the Indian Ocean at Beira. It is navigable for about 100 m. by small steamers. It was first explored by Sir L. S. Jameson and Frank Johnson.

Punic Wars. Series of wars fought between the Romans and the Carthaginians, or Poeni, for the mastery of the western Mediterranean. In the first Punic War (264–241 B.C.) the cockpit of the struggle was Sicily, the largest portion of which was in the hands of the Carthaginians. The Romans, who were not a seafaring people and had no fleet, were at a serious disadvantage against Carthage.

By 260, however, the Romans had built themselves a fleet, and by the use of boarding bridges gained under Duilius a great victory at Mylae, on the N.E. coast of Sicily. In the fighting in Sicily, the Romans had the advantage of the co-operation of Hiero of Syracuse, while the greatest asset of the Carthaginians was the skilful generalship of Hamilcar Barca, who with a comparatively small force held the Roman armies at bay over a long period. In 256 the

Romans attempted to create a diversion by sending an expedition to Africa under Regulus (*q.v.*).

At first successful, the army of Regulus was eventually completely defeated in 255, and the struggle again centred in Sicily. The Romans captured Panormus in 254, and defeated the Carthaginians in battle near that town in 251, but the war dragged on, and it was not until 242 that success finally passed to the Romans by another great naval victory near the Aegates Insulae off the W. coast of Sicily. The defeated Carthaginians were unable to continue to send supplies to their stronghold of Lilybaeum, which had been besieged by the Romans for ten years. With the fall of Lilybaeum, the Carthaginians were forced to give up Sicily, and the two belligerents were glad to make peace.

In the Second Punic War (218–201 B.C.) the scene of the first fighting was Spain, where the Carthaginians, endeavouring to carve out a new dominion for themselves to compensate for the loss of Sicily, came into conflict with the Romans, who had also been extending their dominion in the same quarter. In 218 B.C. Hannibal conceived the idea of carrying the war into Italy. Leading an army across the Pyrenees, and across the still more formidable barrier of the Alps, he descended into the valley of the Po, and after victories at Lake Trasimenus, 217, and Cannae, 216, seemed to have Rome at his mercy. The Greek cities of S. Italy joined him, and Syracuse changed sides. The central Italian states, however, stood firm for Rome.

A skilful general was found in Quintus Fabius Maximus, surnamed Cunctator (Delayer) on account of his non-forward policy. Fabius resisted all temptation to risk a pitched battle, contenting himself with harassing Hannibal on every possible occasion, in the belief that he would thus wear down his strength. These tactics were successful, and the Romans secured a breathing space in which to recover their strength. In 207 the decisive battle of the war, reckoned as one of the decisive battles of the world, was fought.

Hasdrubal, brother of Hannibal, who had had charge of the Carthaginian forces in Spain, outwitted Scipio, the Roman general opposed to him there, and made his way to Italy, with reinforcements. Before he could effect a junction with his brother, however, he was defeated and slain at the battle of the Metaurus. Henceforward Hannibal was doomed. In 206 Scipio decided to carry the war into the enemy's

country, and landed in Africa with an army in 204. Hannibal was recalled in the following year, but at the battle of Zama in 202 his army was completely defeated by that of Scipio. By the terms of the peace concluded shortly afterwards the Carthaginians were compelled to pay an indemnity of £2,350,000 over a period of 50 years, to reduce their navy to ten ships, and to give up Spain.

Carthage was thus reduced to a shadow of her former self. Her commercial prosperity, however, began gradually to return, and this aroused the jealousy of Rome, where there was always a strong party which believed that the only safe policy was the complete destruction of Carthage. The "Délenda est Carthago" (Carthage must be destroyed) of the elder Cato has passed into a proverb. In 149 occasion was found to pick a quarrel with Carthage, and the third Punic War (149-146 B.C.) began. After a vain endeavour to placate Rome, the Carthaginians took up arms, prepared for desperate resistance. No success at first attended the Roman arms, until the arrival in Africa of P. Cornelius Scipio, a descendant by adoption of the conqueror of Hannibal. Scipio brought about the fall of Carthage in 146. The city was razed to the ground, and the territory of Carthage became the Roman province of Africa. See Carthage; Hannibal; Rome; consult Rome and Carthage, R. B. Smith, 3rd ed. 1883; The Second Punic War, T. Arnold, 1886; History of Rome, T. Mommsen, Eng. trans. rev. ed. 1901.

Punishment (Lat. *punire*, to punish). Infliction of pain or suffering for a misdeed. From early historical times some form of definite punishment of wrongdoers by the state has been recognized. The early forms were based upon the principle of retaliation, i.e. the infliction of corresponding pain or suffering upon those who had caused them. This theory of punishment remained in wide practice until the middle of the 19th century when theories of reformation and prevention made headway, until at present the emphasis is all on these aspects of punishment.

Barbarous practices like breaking on the wheel, burning at the stake, hanging and quartering, also aimed at making the punishment so terrible as to act as a deterrent to others, but in this they wholly failed, and it is still a matter of controversy whether such punishments as death, flogging, etc., are deter-

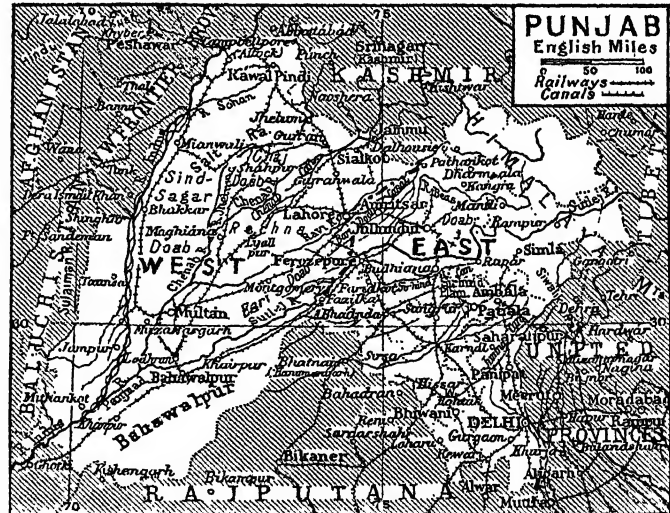
rent in their operation or not. In the army and navy punishments have been even more severe, with the object of preserving discipline, than in the civilian code. Keelhauling (*q.v.*), flogging with the cat-o'-nine tails, and hanging were common up till the 18th century, in the British navy; in 1749, out of 36 articles of naval punishment, no fewer than ten awarded the death penalty without any alternative, and twelve others had death as an alternative. The articles failed through their very severity, and have been mitigated by a number of Acts, as have those of army punishments. See Borstal System; Capital Punishment; Prison.

Punjab, OR PANJAB. Name of an area of the Indian sub-continent. It means land of the five rivers (Jhelum, Beas, Ravi, Chenab, and Sutlej—the confluence of which, the Panjnad, as a left bank affluent, joins the Indus near Alipur). The Punjab was a prov. of British India during 1849-1947. It was annexed by Great Britain after the second Sikh war. It lies N.W. of the United provs., N. of Rajputana and Sind, and E. of the N.W. Frontier prov., which was detached from it in 1901. Delhi

99,089 sq. m., of which 11,000 sq. m. are highlands. The Punjab states cover 37,000 sq. m., of which 12,000 sq. m. are highlands. Included in the highlands are part of the N.W. end of the Himalayas, the foothills of which in the Punjab are known as the Siwaliks. N. of the salt range between the Indus and the Jhelum is a tableland from 1,000 to 2,000 ft. high, much cut up by streams.

The plains cover an area almost as large as the British Isles. They comprise five doabs or riverain tracts, namely, Jullundur between Sutlej and Beas, Bari between Beas and Ravi, Rechna between Ravi and Chenab, Chaj between Chenab and Jhelum, and Sind-Sagar between Jhelum and Indus; the Sirhind plain between the Sutlej and the Jumna on the high land between the Indus and the Ganges river systems; and Bahawalpur between Rajputana and the Indus-Panjnad-Sutlej.

Lahore, formerly the capital of the British prov., became, after partition, the capital of the W. Punjab; Ambala the capital of the E. Punjab. A mass migration of Hindus from W. to E., Muslims from E. to W., and involving in all



Punjab. Map of this former province of British India, showing the partition boundary between Pakistan and India

prov. was detached in 1911. In 1947 the Punjab was divided into W. Punjab, Pakistan, and E. Punjab (later Punjab), India, the boundary passing roughly from the N.E. of Bahawalpur along the Sutlej and then crossing E. of Kasur and Lahore to the Ravi up to the boundary of Kashmir. The whole Punjab has an area of

10 million people, took place shortly after partition and was accompanied by disorders producing great loss of life in the autumn of 1947. On the basis of the 1941 census, the area and estimated pop. of W. Punjab are 62,261 sq. m., 16 million; of (E.) Punjab 36,828 sq. m., 12½ million. Towns with pops. of over 100,000 are Rawalpindi

and Multan (W. Punjab); Amritsar, Ludhiana, and Jullundur (Punjab, India).

Owing to clear skies the climate tends to extremes of heat in the early summer and frost and cold in the winter. During May, a mean daily temp. above 110° F. is recorded at Jacobabad, reputed to be the hottest place in India. The monsoons bring heavy rains in the late summer, and there is a second rainy period in the winter. The Punjab differs from the rest of India in the cold weather rains and the aridity of the plains. The latter caused the British govt. to construct the finest system of irrigation canals in the world; the chief of these perennial canals are called Jhelum, Bari Doab, Chenab, Sirhind, and Western Jumna. Some 15 million acres of land in British Punjab were watered by irrigation in 1945-46.

The arid plains of the S.W. and the highland princely states of the N.E. are scantily peopled; between these two the density of pop. decreases with distance from the Himalayas, except in Rohtak and Gurgaon in the S.E. Nearly 60 p.c. of the people depend on tillage and 20 p.c. on the primitive handicrafts of the weaver, potter, leather-worker, carpenter, and blacksmith. The people include agricultural Jats (20 p.c.), efficient and hard-working cultivators and excellent soldiers; agricultural Rajputs (7 p.c.), generally poor cultivators; Brahmans, Arains, and Kamboh. The chief vernaculars are Lahndi on the W., Panjabi in the centre, and W. Hindi in the S.E. Less than six p.c. are able to read and write, but there are govt. high schools for boys, middle schools, and primary schools.

The first rly. was opened in 1862; the trunk line connects Lahore with Delhi and Karachi and runs N.W. to Peshawar beyond the Indus; most of the connecting lines cross the plains S.W. or S.E. of the trunk line. Total length of rlys. in 1946 was about 4,300 m.; of metalled roads, 4,643 m.

Wheat and barley are the chief crops, wheat covering a quarter of the tilled area. They are winter rain crops, reaped in March and April. Millets, pulses, sugar-cane, cotton, and rice are also grown. Much of the wheat is exported, via Karachi. Oil is extracted in the Attock district.

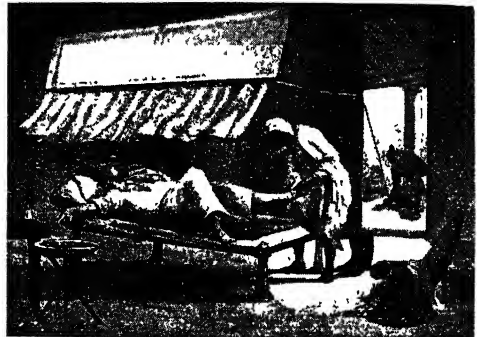
The history of the Punjab and adjacent areas is of considerable interest, in view of the fact that the mountainous ramparts of the Himalayas, Hindu Kush, and

Suleiman mts. tend to restrict human migration. Alexander the Great invaded the Punjab from the W., and reached the Beas (Hyphasis) before he turned back, in 326 B.C. Greek rule ceased when he died, three years later. Asoka, 273-231 B.C., had a long and peaceful reign; for the next twelve centuries the country was dominated by foreign invaders, or split up into numerous petty states. The raids of Turkish soldiers of fortune from the W., notably Mahmud of Ghazni (d. 1030), during the 10th and 11th centuries, resulted in the overthrow of Buddhism. From 1206, for three centuries, Turkish and Afghan sultans ruled from Delhi a kingdom of varying dimensions; during this period the Monguls came, first in 1221, under Jenghiz Khan, and later from 1240 to 1303, at irregular intervals, to ravage the land. Tamerlane, in 1398-99, led his mass-oring Turks to Delhi, and sacked the royal city.

From 1556 until 1707 the Punjab was strongly ruled by Mogul emperors, beginning with Akbar and ending with Aurungzebe; Lahore became their great city. Between 1738 and 1762 Nadir Shah eight times, and Ahmad Shah six times, invaded the Punjab from Persia; the Sikhs rose then to power, and Ranjit Singh, 1799-1839, suppressed all rivals. In 1809 Ranjit Singh pledged himself by treaty with the British to make no conquests S. and E. of the Sutlej. The successors of the great maharaja failed to uphold the pledge, and were defeated in the first and second Sikh wars, and the Punjab was annexed by Britain in 1849. Much unrest was manifest in 1919-20, serious rioting taking place at Amritsar (q.v.) and other places. See India; Indus; Nautch Girl; Pakistan; consult The Punjab, North-West Frontier Province, and Kashmir, J. McC. Douie, 1916; Wealth and Welfare of the Punjab, H. Calvert, 2nd ed., 1936; Chiefs and Families of Note in the Punjab, Griffin and Massey, 1940.

Punjab University. Former educational institution at Lahore.

Created as an examining body in 1882, it derived from Lahore university college, established in 1869 to promote the diffusion of European science as far as possible through the medium of the vernacular languages of the Punjab, and to afford every encouragement to the study of the English language. From 1919 it included also teaching depts., eleven in number in 1946. There were also several affiliated institutions. University faculties included arts, Oriental languages, science, medicine, agriculture, commerce, engineering, law, and dentistry. After partition, 1947, the university was divided into the universities of East Punjab (India) and West Punjab (Pakistan).

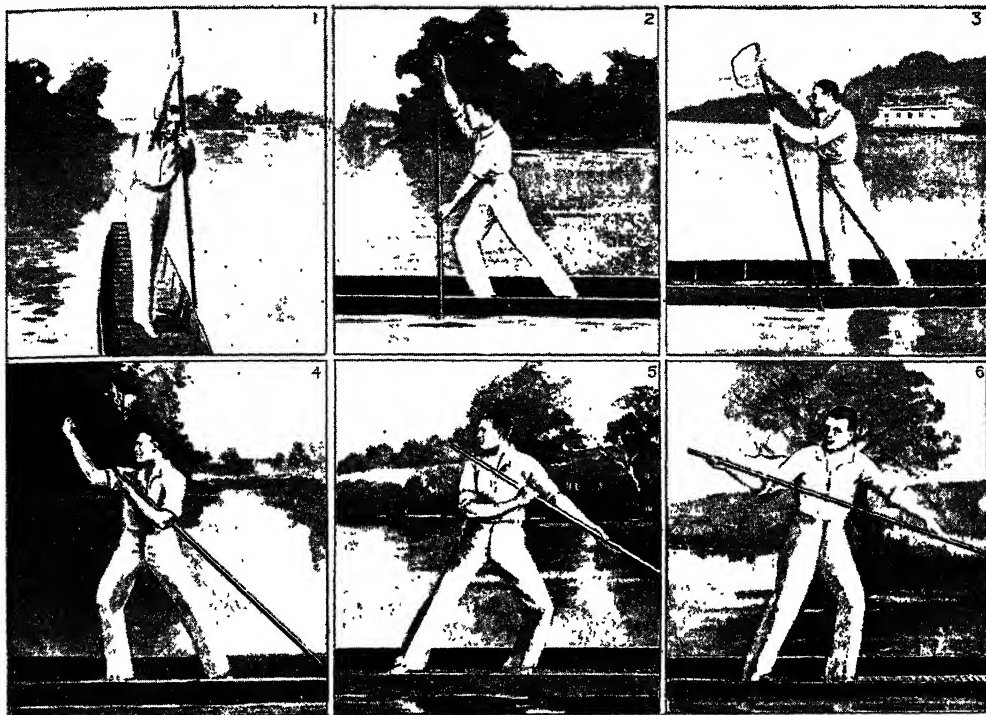


Punkah, the Indian fan suspended from the ceiling and worked from outside the house

Punkah (Hindustani). Name for a large fan used in India. It is fixed to the ceiling, and worked by a servant. The word originally meant a fan of palmyra leaf.

Puno. Department and city of S.E. Peru, on the borders of Bolivia. The dept. has an area of 26,133 sq. m., and contains most of Lake Titicaca, though otherwise largely mountainous. It was formerly celebrated for the wealth of its silver mines; now mining and stockraising are the chief occupations. The climate is cool. Pop. 548,371. Puno, the capital, stands on the W. shore of Lake Titicaca, at an alt. of 12,560 ft., 110 m. direct N.E. of Arequipa, with which it is connected by rly. Alpaca wool is exported. In the vicinity are gold, silver, and copper mines. Pop. 15,880.

Punshon, WILLIAM MORLEY (1824-81). British Methodist preacher. Born at Doncaster, May 29, 1824, he preached at Hull, 1840, and became a Wesleyan minister at Whitehaven, 1845. A stirring preacher, he successfully



Punting. 1. Position for taking stroke in racing punt. 2. Putting in the pole. 3. Beginning of stroke. 4. Middle, and, 5, finish of stroke. 6. Recovering the pole

held charges at Carlisle, Sheffield, and Newcastle-upon-Tyne, before proceeding to Canada in 1868. President of the Wesleyan Conference, 1874, he died April 14, 1881. A selection of his sermons and addresses appeared in 1882.

Punt. Flat-bottomed boat, propelled by means of a pole. In the rules and regulations governing punt races it is defined as a flat-bottomed craft without stem, keel, or sternpost, and the width at each end must be at least one-half of the width at the widest part. Subject to these conditions a punt may be any width or length.

The original punt was a heavily built contrivance, used by Thames fishermen, and had a well for holding water towards the stern, in which the small fish used for bait were kept alive. From this has been evolved the pleasure punt, and the long racing boat often only 16 ins. wide.

The art of punting requires considerable practice and caution on the part of the novice. There are two styles of using the pole: the running method, and the more general one of pricking. In the former a few steps forward are taken each time the pole is pushed against the bed of the river; in the

latter, a more or less stationary position is maintained. The pole should be put in the water well in



Punt Gun, used for duck shooting

front of the operator, and care is required in gathering it for the next stroke.

Punt or Puoni. Ancient name of a region southward of Egypt. Perhaps the biblical Put (Gen. 10), it is especially identifiable with the Somali coast.

Punta Arenas, Seaport town (also called Puntarenas) of Costa Rica, capital of the dept. of Punta Arenas. It stands on the E. coast of the sheltered Gulf of Nicoya, and is the Pacific terminus of the transcontinental rly. from Limón. It trades in coffee and rubber. Pop. 26,375.

Punt Gun. Gun used in a punt for wild-duck shooting. The gun is sometimes made to turn on a swivel or a pivot attached to the barrel; or a gun with a stock is supported on a crutch. The

muzzle-loading type are the cheaper, but breech-loaders are handier, and generally preferred. They are both single and double barrelled.

Pupa (Lat., baby or doll). Resting stage in the life-history of all insects that undergo complete

metamorphosis. During this stage the larva becomes transformed into the perfect insect. No food is



Pupa of (above) Cabbage white Beauty butterfly; and (right) Death's Head moth



taken, but in some insects the pupa is free and active when the adult is due to emerge, and in others it is quite immobile. In moths and many other insects the pupa is enclosed in an earthen cell or in a cocoon. In most butterflies the pupa is naked and is commonly known as a chrysalis. See Insect.

Pupienus Maximus, MARCUS CLODIUS. Roman emperor, A.D. 238. When the tyrant emperor Maximinus had been declared a public enemy by the senate, Pupienus was called to the throne, together with Balbinus (*q.v.*) as joint ruler. Pupienus took the field against Maximinus, whose army surrendered to him, Maximinus himself being killed by his own soldiers. Balbinus and Pupienus, however, could not agree; their authority was defied, and they were both murdered in a revolt of the praetorian guard.

Pupil. Opening in the centre of the iris or coloured part of the eye. The iris has muscular fibres by means of which the pupil can be dilated or contracted so as to regulate the amount of light which passes into the eye. In the presence of a strong light, or when gazing at a near object, the pupil contracts. Shading the eye, or gazing at a distant object, causes the pupil to dilate. Certain drugs called mydriatics, *e.g.* atropine, when dropped into the eye cause the pupil to dilate; others called myotics, *e.g.* physostigmine, cause it to contract. Paralysis of the nerves supplying the iris leads to partial or complete loss of its function, a result which is of value in the diagnosis of nervous diseases often associated with a late form of syphilis. The word (Lat. *pupilla*, little doll) apparently refers to the reflected image seen in the pupil; *cf.* the O.E. phrase "to look babies in the eyes." In another sense—the derivation being the same—the word is used for one who learns from another. See Eye.

Pupin, MICHAEL IDVORSKY (1858–1935). American scientist. Born at Idvor, Serbia, Oct. 4, 1858, he went in 1874 to New York, where he studied physics and mathematics at Columbia university. He pursued the same studies later at Cambridge and under Helmholtz at Berlin. Back at Columbia from 1890, he held minor teaching posts before his appointment as professor of electro-mechanics in 1901. Distinction came with his discoveries in relation to the X-ray, and his success in the extension of telephone and telegraph circuits. Pupin did not

confine his published work to technical treatises, but revealed a fine style in *From Immigrant to Inventor*, 1923, one of the best autobiographies ever written by a European-American. He died March 12, 1935.

Puppet (Fr. *poupée*, doll). General term which includes shadow puppets, rod puppets, glove puppets, glove-rod puppets, and marionettes. The earliest form of puppetry known is the shadow show of ancient China, the *ombres chinoises*, which reached the U.K. by way of Java, India, Persia, Turkey, Greece, Italy, and France. These puppets, whose shadows were thrown on to a screen illumined by the sun, were made from animal or fish skin, preferably buffalo hide or shark skin, which, after being beaten to the required thinness, was dyed, shaped, and jointed to produce whatever movement was necessary, and then mounted on canes or rods. Processions, groups of persons, even single puppets sometimes, were not articulated. This type of puppet, made from specially prepared paper, parchment, or coloured plastics, is, with suitable lighting, very effective.

Rod puppets are figures in the round, usually legless, whose costume or draperies hang down from the waist, hiding the absence of legs. They are carried on a rod that passes through the body into the head, by means of which the head is moved; rods fastened to the hands move them. Graceful and lifelike movement can be suggested by the expert manipulator. Javanese puppets of this type are exquisite examples of the art of the native carver, and are beautifully lacquered, enamelled, gilded, or painted and finely costumed.

Glove puppets are simply gloves worn on the hands to which the head and arms of the puppet are fixed, manipulation being effected by the thumb and first two fingers. The traditional English Punch and Judy worked in this way was popular in England early in the 14th century and there are many records of performances, as well as of names of puppeteers. Glove-rod puppets, a glove puppet worn on the hand with rods to effect arm and hand movements, combine the excellencies of both types.

Puppetry is universal. Different countries have their individual types of puppet theatre in which their legends, fairy tales, and folklore are staged. There is an enormous literature on the subject. In Great Britain there is an association, the British Model Theatre

and Puppet Guild, founded in 1925, whose activities include the publication of an illustrated quarterly *The Puppet Master*, an annual exhibition staged in London, and the development of puppetry as an aid to education. The guild has a lending library. See Marionette; Punch and Judy illus.

Bibliography. Penny Plain, Two-pence Coloured, A. E. Wilson, 1932; Dolls and Puppets, M. von Boehn, Eng. trans., 1932; Puppetry for School and Home, H. W. Whanslaw, 1936; Puppets and the Puppet Stage, C. W. Beaumont, 1938; Hand and String Puppets, W. S. Lancaster, 1943; The Puppet Theatre, J. Bussell, 1946; Wooden Stars, D. Fisher, 1947.

Puppet State. Term used from the 1930s to describe a country whose affairs were known to be controlled by another, although it was ostensibly independent. The classic example was Manchuria, where the Japanese, after seizing the territory from China, installed an emperor. By extension the terms puppet king, puppet premier, and puppet government came in during the Second Great War.

Puranas, THE. Scriptures on which Hinduism is based. The principal Puranas are 18 in number and there are also 18 secondary ones or Upapuranas. Traditionally said to be the works of the compiler of the Vedas, they are of a later period, and, according to Elphinstone (*History of India*), were composed by different authors between the 8th and 16th centuries. They include accounts of the Creation, philosophical speculations, instructions for religious ceremonies, genealogies, fragments of history, and legends of the actions of gods, heroes, and sages.

Purbeck, ISLE OF. Really a peninsula, in the S.E. of Dorset, England. It is bounded N. by the river Frome and Poole Harbour, and W. rather indifferently by streams. It measures about 8 m. N. to S. and 12 m. E. to W., and is crossed E.-W. by a range of chalk hills which rise in Creech Barrow to 660 ft. Downs and heath contribute to the beautiful scenery. Once a deer forest, the "isle" is now noted for its quarries of freshwater limestone known as Purbeck marble, and for china clay. The village of Corfe Castle dozes in the centre, and on the S.E. coast is Swanage. The westernmost third of the area was enclosed for military training during and after the Second Great War.

Purbeck Beds. In geology, name given to the rocks formed at the end of the Jurassic epoch.

They are clays, limestones, shales, marls, and the so-called dirt beds. They are chiefly fresh-water deposits, though containing many marine fossils. In the Purbeck beds have been found remains of dinosaurs, crocodiles, plesiosaurs, shells of many fresh-water mollusca, etc. The Purbeck rocks are named from Purbeck, whence they extend uninterruptedly to Aylesbury, and appear scattered in other counties. The series is famous for Purbeck marbles, and for building and paving stones. *See* Jurassic.

Purcell, HENRY (c. 1658-95). English composer. He is said to have been born in Little St. Anne's



Henry Purcell,
English composer

Lane, Westminster, and was the son of the master of the Abbeychoristers. Henry sang at the Chapel Royal and learned composition from Blow, whom he succeeded in 1679 as organist of Westminster Abbey. He had already set music to a masque included in Shadwell's adaptation of Timon of Athens. From 1682 he also held the post of organist to the Chapel Royal. Next year he published a set of sonatas, composed the first of a series of odes for S. Cecilia's day, and began his interest in anthems. Music for Dryden's Tyrannic Love and songs for D'Urfey's The Fool's Preferment followed in 1686-88.

Then Purcell produced one of the masterpieces of music-drama, Dido and Aeneas, the earliest opera in English entirely without speech; the date of first performance is unknown. In 1690 he contributed songs to Dryden's arrangement of The Tempest; in 1691 collaborated with him in King Arthur. Of The Fairy Queen, 1692, the full score was not discovered till 1901. More festival music included a magnificent Te Deum and Jubilate in 1694, and a beautiful funeral service was written for Queen Mary II. The song, From Rosie Bowrs, was apparently the last work of Purcell, who died Nov. 21, 1695.

Purcell's reputation has never been challenged as the greatest English-born composer. Into an era when elaborate madrigals imitated from abroad were the fashion, he introduced simplicity, originality, and the art of finding the exact musical equivalent for

every mood from joviality to sorrow. In melodic beauty Handel scarcely surpasses him; he is the supreme master of the ground-bass in song form. The marching song Lilliburlero has been attributed to Purcell, but the Trumpet Voluntary is now assigned to Jeremiah Clarke. Among his anthems are They that Go Down to the Sea in Ships; My Heart Is Inditing; Rejoice in the Lord. His vocal music, like his fantasias, chaconnes, sonatas, voluntaries, etc., awaits a complete catalogue. His Life has been written by W. H. Cummings, 1881; D. Arundell, 1928; A. K. Holland, 1932.

Purchas, SAMUEL (c. 1575-1626). English author. Born at Thaxted, Essex, he graduated at St. John's College, Cambridge, and taking orders, became curate of Purleigh, 1601, and vicar of Eastwood, 1604-13. From 1614 he was rector of St. Martin's, Ludgate Hill, and during this period, from many of Hakluyt's MSS, which he had inherited, he compiled Hakluytus Posthumus, or Purchas his Pilgrimes, containing a History of the World in Sea Voyages and Land-Travells by Englishmen and others, 1625. He also wrote Purchas his Pilgrimage, or Relations of the World and the Religions observed in all Ages and Places, etc., 1613; and Purchas his Pilgrim: Microcosmus, or the History of Man, 1619. *Pron.* Purkas.

Purchase. Literally, to obtain by payment. In a special sense the word is used for the system by which commissions in the British army were bought and sold. The practice also prevailed in other armies. In 1871 the proposal of the government to abolish purchase was bitterly opposed in the house of lords. It was, therefore, ended by a royal warrant.

Purchase Tax. Tax introduced by the British govt. as a war measure and first levied on Oct. 21, 1940. The tax was imposed on retail sales of consumer goods with the object of restricting purchases of luxuries and diverting money to national savings and labour to war industries. Food and fuel were exempt, and the tax was graded according to the necessity of the article taxed, reaching a maximum of 100 p.c. After the war, it was progressively reduced on a few articles, abolished on others, but retained on many. The tax is collected through wholesalers who add it to the cost of goods supplied to retailers. The estimated yield for 1950-51 was £295,000,000.

Purchasing Power. A term used in economics to denote the capacity to buy goods and services. The purchasing power of an individual depends on (a) the amount of money possessed, or (b) the ability to acquire money without delay by borrowing, by selling "marketable" things, or in other ways, and (c) the level of prices. When prices generally rise, the purchasing power of those possessing money decreases, as does that of those having rights to receive money. Conversely, when prices fall, the purchasing power of employees, creditors, lenders, etc., increases. The purchasing power of money wages is sometimes termed real wages. Changes in wage-rates tend to lag behind changes in prices.

The purchasing power of a country abroad depends partly on rates of exchange, and partly on the terms of trade, i.e. the relative difference in the prices at which goods are imported and exported. During and after the Second Great War there was in the U.K. a considerable change in the distribution of purchasing power, principally because of the very heavy taxation of large incomes and estates, and because of marked rises in the rates of wages of many classes of manual workers.

Purfleet. A village of Essex, England. It stands on the Thames. 16 m. by rly. E. of London. There have been government powder magazines here since 1781. The harbour has wharves for the landing and storing of goods, and there are oil storage tanks. Pop. 8,511.

Purgative. Substance which promotes evacuation of the bowel. Such substances may be divided into: laxatives or drugs which act as mild stimulants to the muscular coat of the intestine, such as magnesia, olive oil, castor-oil in small doses, honey, figs, prunes, and other fruits; simple purgatives, which stimulate secretion as well as promote muscular movements, and are more powerful in their action than laxatives, the commoner simple purgatives being aloes, rhubarb, cascara sagrada, senna, and castor-oil: drastic purgatives, which strongly stimulate secretion and peristaltic movements of the intestine, such as calomel, podophyllin, scammony, colocynth, and croton oil; and saline purgatives, which largely increase the passage of fluid from the tissues into the intestine. Saline purgatives are the essential constituents of many medicinal waters. A mild laxative at

night and a mild saline on rising make a wise answer to the threat of constipation.

Purgatory (Lat. *purgatorium*, that which cleanses). Theological term for a state of purification through which the souls of the redeemed who die before attaining perfection are held to pass. The doctrine was gradually developed, and is nowhere directly taught in the Bible (see Luke 23, v. 43), the texts adduced being capable of other interpretations. It is, implied in 2 Macc. 12, vv. 41 ff.

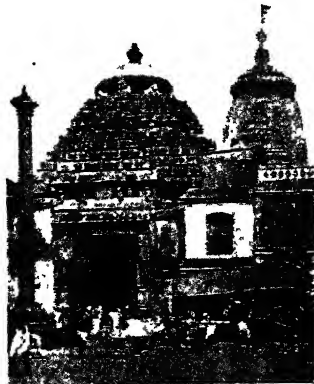
The allusions in the Fathers before S. Augustine are vague. S. Gregory the Great was the first to define the doctrine, A.D. 604. The Eastern Church has generally maintained the existence of a purgatorial state, though denying that it is accompanied by pains beyond the pangs of conscience. The Roman Catholic Church declares that, as death does not in itself cause sanctification, those who, although saved from eternal punishment, die without having made satisfaction for their sins by the fruits of repentance, require to be purified thereafter by punishments. The pains of purgatory, represented as purging fires, are graduated accordingly, and can be mitigated or shortened by the prayers and alms of the faithful, and especially by the Mass.

The council of Trent, while formulating the Roman Catholic doctrine of purgatory, denounced abuses and superstitions connected with it. The Reformers generally denied the doctrine altogether, as it conflicted with their teaching on the Atonement and justification by faith. The Church of England, in the 22nd Article, condemns "the Romish doctrine concerning purgatory."

Among imaginative descriptions of purgatory by far the greatest is the second part of Dante's *Divine Comedy*. He represents it as an island in the Southern hemisphere, rising by seven stages, corresponding to the seven deadly sins, to the earthly paradise. See *Eschatology*; Heaven; Hell; Indulgence; Limbus.

Puri. District and seaside town of Orissa, India. It is 310 m. by rly. S. of Calcutta, on the bay of Bengal, and is the summer headquarters of the Orissa government. Steamers call at Puri only occasionally as there is no safe anchorage or landing place. It is probably the ancient Dautpura, where Buddha's tooth was housed before being sent to Ceylon. The town includes the sacred precincts

of Parushottama, in the centre being the temple or Sri Mandir containing the shrine of Jagannath



Puri, India. The temple of Juggernaut, where the Hindu idol is kept

or Juggernaut (*q.v.*), which is said to date from A.D. 318. The festival of Jagannath's car is attended annually by a huge number of pilgrims. The museum at Puri is much visited by antiquarians and scholars. The district is mostly flat, and it includes the rivers Bhargavi, Daya, and Nun, which flow into the Chilka lake and are navigable during the rainy season. The town is popular as a watering-place, though bathing is dangerous owing to strong currents. Area 2,451 sq. m. Pop., district, 1,101,939; town, 43,614.

Purification of the Blessed Virgin Mary. Festival observed by the Greek, Roman, Anglican, and other churches on Feb. 2, alternatively called in the Prayer Book the Presentation of Christ in the Temple, it commemorates the ceremonial visit of Joseph, the Virgin, and the infant Christ to the Temple, recorded in Luke 2, vv. 22-39. Lev. 12 prescribes the rites, including the offering of a lamb and pigeon, or two pigeons, which concluded the 40 days' ceremonial uncleanness of a woman after the birth of a male child. The Christian festival, recorded at Jerusalem about 450, was introduced in Rome by Pope Gelasius in 494, in place of the pagan Lupercalia. The English name Candlemas alludes to the words of Simeon, Luke 2, v. 32. See *Mary*.

Purim. Jewish festival celebrating the escape of the Jews from the plot of Haman (*q.v.*). Held on the 14 and 15 Adar, about a month before the Christian Easter, the festivities resemble those of Christmas, including present giving, feasting, and merrymaking,

and the performance of religious plays. Formerly an effigy of Haman was carried in procession and finally hanged and burned.

Purine (Lat. *pus, puris, pus*). Fundamental compounds of the uric acid group of organic chemicals. Purine can be prepared by converting uric acid into trichloropurine by means of phosphorus oxychloride, and this yields successively di-iodopurine and purine when treated with iodic acid and zinc dust. Purine has been prepared synthetically. Purine-like substances are known as the purine bases and include uric acid and xanthine, which are found in animal secretions.

Puritans. Name primarily applied in the 16th century to those advanced Protestants among the clergy who wished to purify the Church of England from what they regarded as superstitious and corrupt observances retained after the severance from Rome. From the clergy it spread to their supporters among the laity, and then was applied more particularly to the sectaries who stood outside the Church altogether. Generally, though not necessarily, their doctrines were Calvinistic.

Since the government of the Stuarts was especially repressive towards Puritanism, parliamentary opposition to the crown found in them its strongest supporters, and they claimed to be the champions of religious liberty. Of Puritanism in its best signification Milton, Cromwell, and Bunyan are the supreme types. The Puritans, however, included both tolerationists like Cromwell, and men whose idea of religious liberty was liberty for themselves and the enforcement of their own opinions upon their neighbours. The harshness and rigidity of many of the doctrines most in favour with them, and in especial their view that it was the business of the state to supervise the personal morality of the citizens, caused a severe reaction against the Puritan predominance, and after the Stuart restoration in 1660 the name of Puritan was held up to derision by such satirists as Butler. The New England states of North America were for many years a Puritan stronghold. See *Calvinism*; *Non-conformity*.

Bibliography. English Puritanism and its Leaders, J. Tulloch, 1861; Puritanism in the Old World and in the New, J. Gregory, 1895; The Puritans in England and New England, E. H. Byington, 1896; The Church and the Puritans, H. O. Wakeman, 6th ed., 1902; The First

Two Stuarts and the Puritan Revolution, S. R. Gardiner, 1902; Puritanism in England, H. H. Henson, 1912; The Puritans and Music, P. A. Scholes, 1934; A Puritan Church, O. E. Maures, 1938.

Purl. Hot alcoholic beverage. It is compounded of beer or ale, milk, spirits, sugar, and spice. The spirit may be gin, rum, or brandy; the milk may be omitted and ginger used, but the liquor must be brought almost to boiling point and the ingredients well mixed.

Purley. Residential suburb of London. In Surrey, it forms with Coudon an urban district, and has rly. stations, a tram terminus, and also Green Line connexion with the capital, from which it is 13 m. S. Purley Way is part of the Croydon by-pass on the Brighton road. Riddlesdown is a comparatively rural part.

Purlin. In carpentry, a horizontal beam placed above and secured to the principal rafters of a roof (*q.v.*) along the latter's whole length. It serves to support any weight imposed upon the roof.

Purnea OR **PURNIAH.** Dist. and town of Bihar, India, in the Bhagalpur division. The dist. lies N. of the Ganges, S. of Nepal, and E. of the river Kosi or Kusi. Only two-thirds of the area is cultivated. Paddy fields cover three-fifths of the tilled area. The town, on a branch rly. N. from Katihar, was once a Mahomedan capital. Area of dist., 4,998 sq. m. Pop., dist., 2,390,105; town, 17,500.

Purple (Gr. *porphyra*, purple-fish). Colour intermediate between crimson and violet. In classical antiquity the word denoted the fast purple dye resulting from the exposure to sunlight of a yellowish liquid secreted by whelk-like molluscs of the genera *Purpura* and *Murex*. It is chemically a dibromo-indigotin. Purple robes commanded high prices, and under the Roman emperors were limited to imperial use, hence the phrase born in the purple. The dye was imported into ancient Egypt, and many Biblical references illustrate its importance. It was also used for mural painting, ink, face-rouge, and for staining vellum inscribed in gold.

Purple Emperor (*Apatura iris*). One of the finest British butterflies. Although abundant in Central Europe, it is confined in England to favoured localities in the S., where it is generally uncommon. The caterpillar feeds on swallow, but the butterfly inhabits woodlands, chiefly of oak. It flies swiftly, but may descend to

feed on the juices of carrion, or at foul puddles or exuding sap. Such occasions afford the collector his only chance of capturing the insect. Its large size, deep brown-black colour, banded and spotted with white, make it conspicuous and, in the male, the wings have a beautiful purple iridescence.

Purple Heart. Military decoration of the U.S.A. Instituted by Washington in 1781, it was the first medal for conspicuous military service awarded by the U.S. govt., but after the War of Independence passed into disuse, having been granted on only three occasions. It was revived on Feb. 22, 1932, the bicentenary of Washington's birth. During the Second Great War, it was granted to all military and naval personnel wounded in action under conditions entitling the wearing of a wound stripe. The decoration consists of a heart-shaped medal: on the obverse is a bust of Washington on a purple ground; the bronze reverse carries the inscription For Military Merit. It is attached to a purple ribbon bordered with white by a ring incorporating the Washington family arms.

Purple Light. Phenomenon seen in the western sky soon after sunset. It is an arch-shaped glow of colour, varying from pink to violet, which appears in the western sky at a considerable altitude above the point at which the sun has set. Maximum brilliance is reached when the sun is about 4° below the horizon; then white buildings in the east have a purple glow. The effect is due to diffraction of sunlight by dust particles. See Diffraction.

Purple of Cassius. Purple precipitate formed by adding a solution of stannous and stannic chloride to a dilute solution of gold chloride. First prepared by Andreas Cassius of Hamburg, about 1683, it was described in a pamphlet by his son of the same name. Much discussion has taken place as to the original composition, the modern view being that it is a mixture of colloidal gold and colloidal stannic acid. Its chief use is for preparing ruby glass. The formation of the coloured precipitate is extremely sensitive; it has been said that one part of gold in 100 million parts of solution can be detected. The depth of colour produced is proportional to the amount of gold present, and a quantitative method has been developed for determining the gold content of cyanide solutions.

Purple-wort OR **MARSH CINQUE-FOIL** (*Comarum palustre*). Perennial herb of the family Rosaceae,



Purple-wort. Foliage and flowers

a native of Europe (including Great Britain), N. Asia, and N. America. Upon a long, woody rootstock rise tall stems of purple-brown tint. The leaves are divided into five or seven leaflets with toothed edges. The sparse flowers have short, dark purple-brown petals and larger sepals which are purple on the inner face. The root-stock is an astringent, and a yellow dye is obtained from it. It is also known as *Potentilla palustris*.

Purpura. Red or purple patches of the skin due to haemorrhage from the superficial blood-vessels. It is a symptom of a large number of diseases, including cerebrospinal meningitis, smallpox, and scurvy, and may follow the administration of certain drugs; or may be associated with rheumatism.

Purpura. Genus of marine gastropods. *P. lapillus*, the dog whelk, sometimes called the dog winkle, swarms on the rocks around the British coasts, resembles in form a small whelk, and has a whitish shell with spiral bandings. Chiefly found on the rocks between tide marks, it is carnivorous in habit, feeding mainly on mussels, and is destructive in oyster beds, drilling holes through the shell with its radula and extracting the inmate. It derives its scientific name from the secretion of an indelible purple dye from a gland behind the head. See Gastropoda; Mollusca.

Purple. One of the tinctures in heraldry. It is represented in drawings by thin diagonal lines from sinister chief to dexter base. See Heraldry; Tincture.

Purser (corruption of bursar). Former commissioned rank in the Royal Navy. The purser kept the accounts of a warship and had charge of the provisioning,

clothing, and payment of the crew. The rank was abolished in 1850 and replaced by that of paymaster. Passenger and cargo liners of the merchant navy carry pursers who rank as officers and act as business managers of the ship. They look after valuables, have authority to alter cabin allocations, stage-manage entertainments, and keep the ship's accounts.

Purslane (*Portulacaceae*). Family of succulent herbs of wide distribution but particularly found in N. and S. America. *Claytonia perfoliata*, with white, notched petals and numerous stems having one leaf below the flower clusters, is a common English weed. *Montia fontana* is blinks or water chickweed.

Sea purslane (*Arenaria peploides*) has a creeping rootstock, short, forked flower stems, fleshy leaves, and few flowers. Water purslane (*Peplis portula*), found in wet places throughout England and Ireland, is a small creeping annual with sessile flowers in the axils of the leaves. These latter plants do not belong to the purslane family; sea purslane is a member of Caryophyllaceae, and water purslane of hythraceae.

Pursuivant (Fr. *poursuivant*, attendant). Title of the junior officers of arms. Formerly they were the messengers and executive officers of the earl marshal's court, as well as the assistants and secretaries of the heralds. They derive their individual titles from honoured badges and other insignia. The pursuivants of the Heralds' College are Bluemantle, instituted by Edward III as an extra officer to the Order of the Garter; Rouge Croix in allusion to the cross of S. George; Rouge Dragon and Portcullis, both instituted by Henry VII, in allusion to the Welsh dragon of the Tudors and the Beaufort badge which had come to their house by alliance. Pursuivants, like heralds, wear tabards. The Scottish pursuivants are named Dingwall, Unicorn, and Carrick. See Herald; Tabard.

Purulia. Town of Bihar, India, in Manbhum dist. It is the headquarters of the dist. and a rly. junction for Ranchi, Asansol and Jamshedpur. Pop. 24,000.

Purús. River of S. America, a tributary of the Amazon. Rising in La Montaña, E. Peru, it enters Brazil through Acre Territory and flows N.E. across the state of Amazonas to join the Amazon through a large delta, about 120 m. above Manaus. Its length is estimated to be about 1,850 m. Sluggish and

extraordinarily winding, it is navigable for steamers for 1,850 m.

Purveyance (Lat. *providere*, to provide). The right claimed by English and other kings to requisition, when travelling through the country, whatever was needed by themselves and their retinue in the way of provisions and services. This right, which appears to have been exercised from the earliest times, was naturally liable to great abuses. The grievance was dealt with in Magna Carta, and was the subject of much legislation from Edward I's time, but was not abolished until 1660. See Royal Household.

Pus. Collection of dead, white blood corpuscles, resulting from inflammation. See Inflammation; Suppuration.

Pusey, EDWARD BOUVERIE (1800-82). British divine. Born at Pusey, Berks, Aug. 22, 1800,



Edward Pusey,
British divine

he was a son of Jacob Bouverie (a son of the 1st Viscount Folkestone), who took the additional name of Pusey on succeeding to estates there. Educated at Eton and Christ Church, Oxford,

Edward became a fellow of Oriel College, was ordained, and studied Biblical criticism, and oriental languages at German universities. He made a reputation as a theologian, and in 1828 was elected professor of Hebrew at Oxford and canon of Christ Church. Pusey gave much time to studying the usages of the Church in the past, and in a series of sermons laid down the principles on which the High Church movement was founded, while he contributed to Tracts for the Times. For a sermon preached in Oxford, May 14, 1843, he was suspended from preaching for two years. But the movement was widely successful, and from its inception Pusey was its acknowledged head, remaining its guide until his death in Oxford, Sept. 16, 1882. His writings include *Doctrine of the Real Presence*, 1865. Pusey House, a theological centre in Oxford, is a memorial of his life and work. See Oxford Movement; *consult* Lives, G. W. E. Russell, 1907; L. Prestige, 1933.

Push-Ball. Game invented by M. G. Crane, of Massachusetts, in 1894. It was introduced into Great Britain a few years later but never became popular. There are two sides of 11 players each,

divided into forwards, right wings, left wings, and goalkeeper. The goalposts are 18 ft. high and 20 ft. apart, with a crossbar 7 ft. from the ground. The ball used is 6 ft. in diameter, and weighs 50 lb. The playing area measures 140 yds. by 50 yds. Pushing the ball under the bar counts five points, and eight points are scored if it is thrown over the crossbar. A type of push-ball has been played at military tournaments in the U.K.

Pushkin, ALEXANDER SERGËEVITCH (1799-1837). Russian poet. He was born at Pskov, May 26,



1799. His father was a member of an old noble family, and his mother a granddaughter of Abraham Petrovitch Hannibal, the negro favourite of Peter the Great. He was educated at the lyceum at Tsarskoe Selo, and was early noted for his mastery of languages. His first poems were published when he was fifteen, and he entered the civil service in 1817.

In 1820 his fairy-tale poem, *Ruslan and Ludmilla*, gave him immediate fame, but in the same year he was banished to Bessarabia on account of his Ode to Liberty, circulated in MS. Visiting the Caucasus, he found inspiration for much fresh work, notably *The Prisoner of the Caucasus*, 1822. In 1824 an intercepted letter, in which he spoke slightly of religion, caused his banishment to his father's estate in the prov. of Pskov, and there in two years he wrote much of his best work, including a large part of the autobiographic poem, *Eugene Onegin*, and his great tragedy, *Boris Godunov*, 1825. In 1826 he was allowed to return to St. Petersburg. Poltava, 1828, was a fine narrative poem.

Appointed historiographer to the crown, he wrote a *History of the Revolt of Pugachev*, 1833, and a short novel of the same period, *The Captain's Daughter*, 1836. He was wounded in a duel, Jan. 27, 1837, and died two days later. During his short life Pushkin wrote much, despite a fondness for society and periods of dissipation; and he occupies one of the highest positions in Russian literature, continuing to enjoy popularity after the Revolution. *Consult* Pushkin, E. J. Simmons, 1937;

Pushkin and Russian Literature, J. Lavrin, 1947.

Pushkin. A town of the R.S.F.S.R., 15 m. S. of Leningrad and in that region. Originally called Detskoe Selo (children's village), it became the summer residence of the imperial family in the reign of Catherine the Great, who renamed it Tsarskoe Selo; after the revolution of 1917 it was called after the great writer (*v.s.*). The town contained two imperial palaces, the larger 800 ft. long and surrounded by parkland. It was noted for its lavishly decorated apartments and works of art. Pushkin was captured by the Germans during their advance on Leningrad in July, 1941, and retaken by the Soviet army on Jan. 24, 1944. Before withdrawing, the Germans devastated the town and deported the inhabitants to Germany.

Pushtu or Pashto. Language spoken by the Pathan peoples of the North-West Frontier province of Pakistan, Baluchistan, and Afghanistan E. of the Helmund. It is essentially Iranian, with an admixture of Indo-Aryan words. The N.E. or hard Pukhtu dialect of Peshawar is allied to sub-dialects in Buner, Swat, and Bajaur, and to those of the Yusufzai, Orakzai, Ghilzai, Mohmands, and Afridi. The S.W. or soft Pushtu dialect is also highly differentiated, in Bannu, Waziristan, and Kandahar. The literature, traceable back to the 15th century, embraces history and ballad poetry. *See* Iranian; Pathan.

Pussyfoot. Nickname given to the advocate of prohibition, W. E. Johnson (*q.v.*), probably from his silent methods of tracking down offenders against the law, when engaged in suppressing the liquor trade in Indian territory.

Pussy Willow. Popular name for the tree *Salix caprea* described under Sallow.

Pusztas. Temperate grasslands of the Hungarian plains. Formerly almost entirely devoted to stock-rearing, the pusztas have now become one of the chief wheat-producing regions of Europe. Hungarian wheat and flour are among the finest in the world. Horse-rearing is an occupation in the drier parts. *See* Alföld; Steppe.

Putlog or Putlock. Horizontal piece of timber inserted into holes in masonry for the purpose of supporting timber. *See* Scaffolding.

Putnam, GEORGE HAVEN (1844-1930). American author and publisher. Born in London, April 2, 1844, he was educated at Columbia grammar school, New York, the

Sorbonne, Paris, and Göttingen university. He served in the 176th New York cavalry during the Civil War, and was a prisoner at Libby and Danville, 1864-65. President of G. P. Putnam's Sons, publishers, he did much to promote the American copyright bill of 1891. His books include *Authors and Publishers*, 1883; *The Question of Copyright*, 1891; *Abraham Lincoln*, 1909; and two volumes of *Memories*, 1914 and 1915. Putnam died Feb. 27, 1930.

Putnam, GEORGE PALMER (1887-1950). American publisher and writer. Born at Rye, N.Y., Sept. 7, 1887, and educated at Harvard and California universities, he became director of G. P. Putnam's Sons and president of the Knickerbocker Press 1919-30. Director of



the American museum of natural history expedition to Greenland, 1926, and of an expedition to Baffin Island the following year, he served in the U.S. army air force

during the Second Great War. He married Amelia Earhart (*q.v.*), the aviator, of whom he wrote a biography, *Soaring Wings*, in 1940. His other publications included *The Southland of N. America*, 1913; *Wide Margins*, 1942; *Duration*, 1943. He died Jan. 4, 1950.

Putney. London suburb. Situated on the Thames, S. of Fulham, and in the co. of Surrey, it forms part of the met. bor. of Wandsworth, and is included in the bor. constituency of Wandsworth (Putney). It is connected with the City and West End by rly., underground rlys., bus, and river transport. The parish church of St. Mary has a 14th-century tower, restored when

the church was rebuilt in 1836, and a fine chantry, N. of the chancel, built by Bishop West in 1533. The bridge, by Bazalgette, 1886, replaced a wooden structure which, in 1729, superseded an ancient ferry. It was greatly widened in 1933. Putney is the headquarters of many rowing clubs and the starting-point of the Oxford and Cambridge boat race. A pier for river passenger service was built in 1948. A public library was the gift of Sir George Newnes. The Royal Hospital for Incurables dates from 1854. On Putney Heath, which adjoins Wimbledon Common, are reservoirs of the Chelsea water-works.

At Putney, called Putelei in Domesday, and included in the manor of Wimbledon, Harold had a fishery. Elizabeth was a frequent visitor at Putney Palace, the residence near the river of John Lacy. Notable residents have included Thomas Cromwell, Gibbon, Mrs. Siddons, William Pitt, Swinburne, Watts-Dunton, Sir George Newnes, J. P. Morgan, and, during his Nazi-enforced exile, President Eduard Benes, of Czecho-Slovakia. Clement Attlee was born here. Putney Heath, once notable as a duelling centre, had during 1690-1750 the most famous bowling green near London.



Putney, London. The High Street, and, left, the 14th cent. tower of the parish church of St. Mary

Putney suffered little damage in the earlier air raids of the Second Great War, but many houses, shops, and churches were destroyed in 1944, particularly by flying bombs. On Nov. 7, 1943, a single bomb dropped by a lone German raider caused one of the most calamitous "incidents" of the war, falling on a dance-hall over a milk bar, and close to bus queues as people emerged from cinemas. Over 80 were killed and many more injured. Pop. 70,835.

Putrefaction. Changes which occur in organic matter after death. They result from the action of bacteria upon simple substances, and in their course foul smells and

poisonous material are produced. See Decomposition.

Putsch. Swiss dialect word meaning push or thrust; originally a shower. It is now internationally accepted for an unexpected revolt of limited size and with the employment of force. Examples have been frequent in Latin America, and European ones include the ousting of the Stambolisky dictatorship in Bulgaria, 1923; the Kapp putsch of 1920 which tried to overthrow the Weimar republic by the seizure of Berlin; and the Hitler putsch of 1923 at Munich.

Puttee (Hindi *patti*, bandage). Long strip of cloth used as a leg covering. About 3 yds. long and



Puttee, as formerly worn by infantry

4 ins. wide, the puttee is wound spirally round the leg between knee and ankle, drawn tight, and secured with tapes. First used in the Indian army, it was adopted as part of the khaki service uniform of British troops.

For cavalry the puttee was wound downwards and the tapes secured at the ankle; for infantry it was wound upwards and tied below the knee. In 1937 the British and Indian armies abolished the puttee with the introduction of battledress, replacing it with the canvas anklet. A short puttee was retained for kilted regiments.

Putter. Shortest golf club. Designed for use on the green, it has a straight face and is used to propel the ball into the hole from a distance of anything between 20 yards and one inch. Putters vary considerably in shape, from the putting cleek to those with a comparatively massive wooden or aluminium head. See Golf.

Putting the weight or shot. An event included in the programme of most athletic meetings. According to A.A.A. rules, a competitor must stand within a 7 ft. square to cast the shot or iron ball, which should weigh exactly 16 lb. The shot must be "put" by a

fair push from the shoulder, not thrown. Length of the put is calculated from the front line of the square to the spot where the weight pitches. In America the putter stands within a 7 ft. circle, the rim of which is raised to prevent overstepping. The amateur world record was made by C. Fonville, of the U.S.A., with 58 ft. 0½ in., in 1948. The Olympic Games record, by W. M. Thompson, of the U.S.A., 1948, was 56 ft. 2 in.

Putty. Plastic mixture of fine dry whiting or powdered chalk and linseed oil and usually white lead. It is used by glaziers for fixing window panes, and by painters for stopping nail holes and crevices and irregularities in woodwork. Plasterers' putty, or lime putty, consists of pure lime slaked with water until a creamy liquid is formed. After being sieved the mixture is allowed to stand for six weeks to several months, and is then used as a final coat in plastering walls, etc.

Pu Tu or Pootoo. Narrow island, lying 1½ m. E. of Chusan Island in the China Sea. It is 3½ m. long, and only half a mile wide at its narrowest part. The island is consecrated to the Bodhisattva Avalokiteçvara (Chinese, Kuan Yin) or goddess of mercy, the guardian deity of sailors. Pu Tu is one of the most celebrated centres of Buddhism, and is visited by thousands of pilgrims from China, Japan, and Korea. Its fame dates back to 858, when a Japanese monk founded a temple here.

Putumayo. Unorganized territory (commissary) and river of Colombia, S. America. It borders on Ecuador, and is in part claimed by that republic and Peru, but its boundaries are not yet defined. It is named from the river Putumayo or Iço, which traverses it. The capital is Mocoa. One estimate of the area is 10,220 sq. m. Pop. 15,688. The river rises near Pasto in Colombia, flows E. by S., and unites with the Amazon near São Antonio. It is navigable for small craft for 700 m.

Putumayo Atrocities. Name given to a series of offences in the Putumayo district of Peru, near

the Colombian frontier. In 1909 allegations were made by an English writer of gross ill-treatment of native labourers in rubber plantations owned by the Peruvian Amazon Company, a British enterprise formed in 1907. An official inquiry was made by Roger Casement (q.v.) under British government orders. His report described the existence of systematic atrocities of a revolting kind, and action by Great Britain and the U.S.A. brought the punishment of some offenders by the Peruvian government.

Puvis de Chavannes, PIERRE CÉCILE (1824-98). French painter.

Born at Lyons, Dec. 14, 1824, he studied engineering, but a visit to Italy determined him to adopt an art career. He studied under Henri Scheffer, De. lacroix, and Couture, but developed a wholly original decorative style of his own, especially in mural painting. No recognition was given to him till 1861, when his two canvases, War and Peace, were bought for the state. In 1876-77 he decorated the Panthéon



P. Puvis de Chavannes, French painter



Puvis de Chavannes. An Allegory, by this French painter, famous especially for his frescoes

(Paris) with paintings of the childhood of S. Geneviève, and in 1886-88 completed his great Hemicycle at the Sorbonne. The Marseilles, Amiens, Rouen, and Lyons museums were all adorned with his flat-toned frescoes on canvas. The Poor Fisherman, one of his few easel pictures, is in the Louvre. He died Oct. 24, 1898.

Puy de Dôme. Department of France. In the centre of the country, its area is 3,090 sq. m. It is a mountainous region, with many extinct volcanoes, the craters of



Putting the Weight. An Oxford athlete about to cast the shot

which are rich in oil, lead, and granite. The chief rivers are the Allier, Cher, Dore, and Dordogne, and the highest peak is the Puy de Sancy (6,188 ft.). The Puy de Dôme itself is 4,800 ft. high. In the department fruit, rye, and potatoes are grown, and there are vineyards, its most fertile part being the plain of Limagne. The department has valuable coal mines and a number of mineral springs. Clermont-Ferrand is the capital and much the biggest place; other towns are Riom and Issoire. Before the Revolution the department was included in Auvergne, Bourbonnais, and Lyonnais. Population 478,732.

Pu Yi, HENRY (b. 1906). Former emperor of Manchukuo. Son of Prince Chun, he succeeded to the throne of the Chinese empire in 1909, reigning as Hsuan Tung, but was de-throned by the revolution of 1911. Replaced for a week by a monarchial coup in 1917,



Henry Pu Yi,
Emperor of Man-
chukuo

he was expelled from Peiping in 1924 when the city was occupied by Feng Yu-hsiang, and took refuge in the Japanese legation. He later escaped to Tientsin. In 1932 he was set up by the Japanese as head of the puppet state of Manchukuo (Manchuria), and was enthroned in 1934 as the emperor Kang Teh. With the Japanese defeat in the Second Great War he was arrested by the Russians at Mukden and interned.

Puymorens Tunnel. Tunnel of the Pyrenees on the direct route between Toulouse and Barcelona. The Col de Puymorens, 6,295 ft., is on the watershed between the valley of the Ariège in France and that of the Segre in Spain. By an agreement between France and Spain, made in 1907, a rly. was to be constructed on this route; the most formidable engineering work was the cutting of the Puymorens Tunnel, which is perfectly straight, $3\frac{1}{2}$ m. long, $14\frac{1}{2}$ ft. wide, and 18 ft. high. The engineers, working S. from L'Hospitalet and N. from Porté, met on Dec. 24, 1914.

Puzzle (Mid. Eng. *opsaile*, question). Question or contrivance to perplex the mind. It may be a perplexing question; an arrangement of letters or words, inviting solution (e.g. an acrostic, anagram, etc.); or a toy or device

of wood, metal, or other material, which has some intricate way of being arranged, fastened, or unfastened. Examples of these last are the Chinese Tangram, one of the first contrivances to be called a puzzle, which consisted of a square piece of wood dissected into geometrical pieces that could be arranged so as to form a huge number of figures; and the Chinese rings linked on to a bar that had to be detached and replaced. See Crossword; Jig-Saw; Maze.

Pwllheli. Mun. borough, seaport, and market town of Carnarvonshire, Wales. It stands on Tremado Bay, at the N. side of Cardigan Bay, 21 m. S.S.W. of Carnarvon, and is served by rly. It has a good harbour, is a centre of the crab and lobster fisheries, and has a small fishing fleet. Lead, copper, and manganese are found in the neighbourhood. There are excellent sands, good bathing, and a large holiday camp. Near the town much land has been reclaimed from the sea. Pwllheli, the name meaning salt pool, became a borough in the 13th cent. Market day, Wed. Pop. 4,200.

Pyaemia (Gr. *pyon*, pus; *haima*, blood). Form of blood poisoning (*q.v.*) in which micro-organisms in the circulation cause abscesses to appear in various parts of the body. Penicillin and the sulphonamides have proved helpful.

Pyapon. Dist. and town of Burma, in the Irawadi division. The dist. occupies 2,148 sq. m. in the E. portion of the Irawadi delta. Rice is the sole crop. The town is situated some miles from the coast and the river channels. Pop., dist., 385,008; town, 10,000.

Pyatigorsk. Town of the N. Caucasian area of the R.S.F.S.R. It is on the river Podkumok, and on a branch of the Vladikavkaz rly., and is famous for sulphur springs. Mt. Elbruz, 60 m. distant, may be seen from the square. During the Second Great War the town was recaptured by the Russians, Jan. 11, 1943, after being in German possession since Aug. 24, 1942. Pop. 62,875.

Pydna, BATTLE OF. Fought in 168 B.C., at the town of that name in Macedonia, between the Romans under L. Aemilius Paulus, and a Greek army under Perseus, last king of Macedonia. The battle is memorable in military history for the final triumph of the loose formation of the Roman legionaries armed with short swords over the phalanx (*q.v.*) of spearmen.

Pye, HENRY JAMES (1745-1813). British poet laureate. The son of

Henry Pye, M.P., of Faringdon, he was born in London, Feb. 20, 1745, and educated at Magdalen College, Oxford. In 1766 he inherited his father's estate, but so heavily was it encumbered that soon after his own election as M.P. for Berkshire in 1784 he was obliged to sell it. He retired from parliament in 1790, and in that year succeeded Warton as poet laureate, mainly as a reward for his loyalty to Pitt; for though he had a sincere love of letters, his poetry was dull and pedestrian. The appointment provoked general ridicule, but Pye retained it with complacency until his death, Aug. 13, 1813.

Pye Corner OR **PIE CORNER.** London landmark, at the N. end of Giltspur Street, E.C. The name is said to have been derived from an inn. A small gilt figure of a fat boy on the corner house of Cock Lane perpetuated the legend that the Great Fire of 1666, starting at Pudding Lane and finishing at Pye Corner, was due to gluttony. In fact, while it was stopped at Cock Lane, it continued to rage about Cripple-gate 20 hours after Pye Corner had been razed. See Great Fire.

Pyelitis (Gr. *pyelos*, pelvis). Inflammation of the pelvis, or inner part, of the kidney; most often due to a stone in the kidney, which may need surgical removal, or to extension of inflammation from the bladder or neighbouring organs. The symptoms are pain in the back, irritability of the bladder, blood or pus in the urine, and intermittent fever. The urine should be rendered either acid or alkali according to the nature of the infecting germ. Penicillin and the sulpha drugs help treatment.

Pyeshkov, ALEXEI MAXIMOVITCH (b. 1869). Russian author, best known by his pen-name of Maxim Gorky (*q.v.*).

Pygmalion. In Greek mythology, king of Cyprus, who made a statue in ivory of a beautiful maiden. He was so charmed with his creation that he fell in love with the statue and prayed to the goddess Aphrodite to give it life. His request was granted and he married the maiden and had by her a son called Paphus. See Galatea.

Pygmalion. Play by Bernard Shaw. It was produced April 11 1914, at His Majesty's Theatre, London, where it had a run of 118 continuous performances. The story deals with the transformation of a Cockney flower-girl, Eliza Doolittle, into the semblance of a duchess, almost entirely by altering her enunciation under the tuition of a professor of phonetics,

Henry Higgins. In the original production Higgins was played by Tree, Eliza by Mrs. Patrick Campbell. In a film version, 1939, the parts were played by Leslie Howard and Wendy Hiller. The play gained notoriety for its introduction, then almost unprecedented on the London stage, of the vulgar expletive "bloody."

Pygmy. Name applied to diminutive peoples. Derived from the Gr. *pygmē*, the measurement of the



forearm and the closed fist, the term was used by Homer and Herodotus for fabled races in Ethiopia and India. It now denotes the dwarf tribes encountered by Schweinfurth, du Chaillu, Stanley, and others in equatorial Africa, and the negritos of S.E. Asia. See Dwarf Races; Giant; Negrito.

Pyjamas. Form of nightwear consisting of a loose jacket and trousers. The word is Anglicised from the Persian *pa'ejama*, lit. leg clothing, trousers, fastened by a cord or cummerbund. The wearing of pyjamas by both sexes has increased greatly during the 20th century, the form having almost entirely superseded the male nightshirt; children's pyjamas are sometimes a single combination garment, and in some the cord is replaced by elastic. In another form they gained popularity as feminine beach-wear.

Pyldes. In Greek mythology, the devoted friend of Orestes, who gave him his sister Electra in marriage. The friendship of Orestes and Pyldes is proverbial.

Pylon (Gr., gateway). Massive temple-portal in ancient Egypt. Developed at Thebes in the XVIIIth dynasty, it usually comprised a monolithic lintel, corniced on lofty jambs, and flanked by two truncated pyramidal towers, with sculptured hieroglyphs. Vertical grooves held poles for coloured streamers on feast-days. The approach was between royal statues, often colossal, and a pair of obelisks. A notable example, Edfu, is 250 ft. wide, and 115 ft. high. At

Karnak (*q.v.*), five successive pylons were added to the Great Temple of Senusert I in subsequent reigns. See Architecture illus., p. 569; Egypt illus., p. 2962.

Pylon. Tapering lattice tower built of steel to carry heavy power cables. In aeronautics it is the structure over the fuselage of a helicopter which supports the rotor arms. The name is also given to structures marking the course for aircraft racing in closed circuits. The "pylon school" of poetry was a phrase coined to describe the work of writers who believed that industrial machinery



Pygmy. A pygmy of the Belgian Congo, and, left, inhabitants of the Andaman Islands

was a suitable subject for poetry; the actual poem, Pylons, being by Stanley Snaith.

Pylorus (Gr. *pylē*, gate; *ouros*, warder). Distal or intestinal aperture of the stomach. It is surrounded by a ring of muscular fibre which, following a meal, is in a state of contraction, thus retaining the food in the stomach for the process of digestion. At varying intervals the muscular fibres relax, and food is allowed to pass into the intestine for further digestion.

Pylos. Town in S.W. Messenia, ancient Greece, about 60 m. W. of Sparta. In legendary times the venerable Nestor, of the Homeric poem, was its king. In 425 B.C. it was seized by the Athenians in the Peloponnesian War; and in the adjacent Bay of Navarino the Turkish fleet was defeated by the allied fleets of the British, French, and Russians in 1827, a victory which secured the independence of Greece. The modern Pylos or

Navarino (*q.v.*) stands at the S. end of the bay.

Pym, JOHN (1584-1643). English statesman. He was born at Brymore, Somerset, and educated at Pembroke College (then Broadgates Hall), Oxford, afterwards becoming a student at the Inner Temple, though he was never called to the bar.

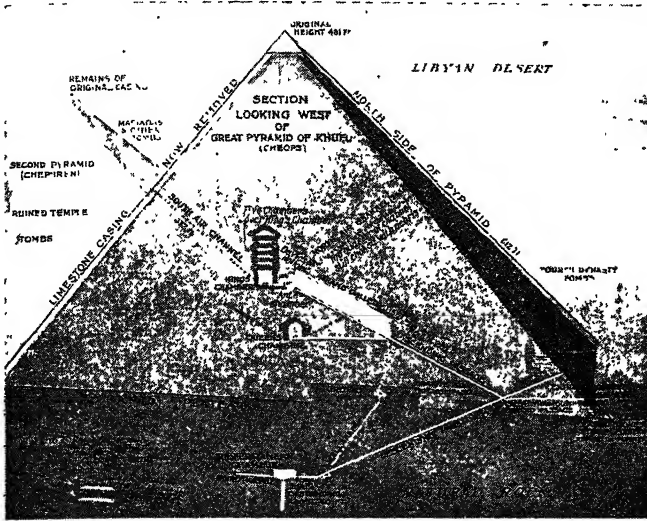


John Pym, English statesman

In 1614 he became M.P. for Calne, and in 1625 for Tavistock. Already a prominent member of the parliamentary party that was coming into conflict with the crown, he was one of the managers of the impeachment of Buckingham in 1626, one of the chief supporters of the Petition of Right in 1628, and in 1629 an energetic opponent of the tonnage and poundage proposals. Between 1630 and 1640 he was engaged in schemes for the settlement of Connecticut.

Pym was in effect the leader of the Short Parliament of 1640, moved the impeachment of Laud, took a principal part in that of his former friend Strafford, and had a share in the Grand Remonstrance of 1641, when he first put forward the proposal to check the royal power by making ministers responsible to parliament. He was one of the five members whose attempted arrest by the king in 1642 precipitated the Civil War. By now the inseparable ally of Hampden, he controlled the party headquarters when the struggle broke out; secured an alliance with the Scots, himself becoming a Presbyterian; and was made master of the ordinance a month before he died on Dec. 8, 1643. Pym was allowed by all to have been a great parliamentarian, but royalists necessarily regard his dealings with the Scots against King Charles as questionable. A Life by S. R. Brett was published in 1943.

Pyorrhoea. Disease (*Pyorrhoea alveolaris*) of the tissue surrounding the necks of the teeth. It arises in the gums and possibly in alveolar processes, i.e. those connected with the sockets of the teeth. Its characteristic symptom is the exudation of matter from the gums around the necks of the teeth. Associated with this is inflammation of the gums; they recede, alveolar bone is lost, and the teeth become loose. Rings of tartar collect under the edges of



Pyramids. Diagram indicating the arrangement of the chambers, passages, and air channels in the Great Pyramid

the gums, giving rise to halitosis. The causes of pyorrhoea are lack of cleanliness, breathing through the mouth, and certain illnesses, especially fevers. Deposition of tartar follows the lack of cleansing. Artificial methods which help to prevent pyorrhoea include massaging the gums with fingers night and morning, and using a mild antiseptic mouth-wash.

Pyramid. In geometry, a polyhedron, one of whose faces, the base, is a figure of three or more sides, i.e. polygon, and the others triangles. The latter meet at a point, the vertex of the pyramid. When the base is a regular polygon and the vertex is on the perpendicular to the base from its centre point, the pyramid is called a regular pyramid.

Pyramids. Monumental structures on a polygonal base, usually square, with triangular sides, generally in one plane, sloping to an apex. The word is the grecoised form of an Egyptian term. Conjectured at various times to be

astronomical observatories, standards of measurement, treasure-houses, and even Joseph's granaries, these monuments, originated in early dynastic Egypt, are simply gigantic tombs, each pyramid designed for a single interment.

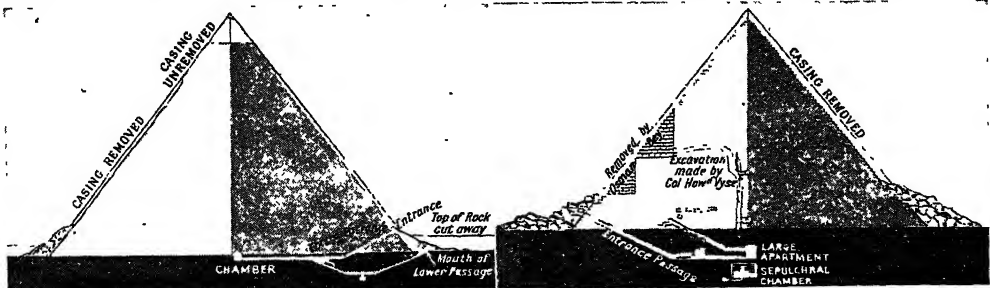
About 75 examples remain in the necropolis field of Memphis, on the left bank of the Nile between Abu Roash and Dahshur. They stand on the desert edge just beyond the cultivated alluvium, above high-Nile. The design emerged from the mastaba-tomb, and a transitional form occurs in the step-pyramid at Sakkara, erected by Tchoser of the IIIrd dynasty. This comprised a limestone mastaba, periodically enlarged until it became a quadrangular turret in seven diminishing stages.

At the end of the IIIrd dynasty Seneferu, when erecting at Medium a similar structure, formulated the pyramid type by adding casing blocks to impart continuous slope to the sides, and removing the funerary chapel to the outside.

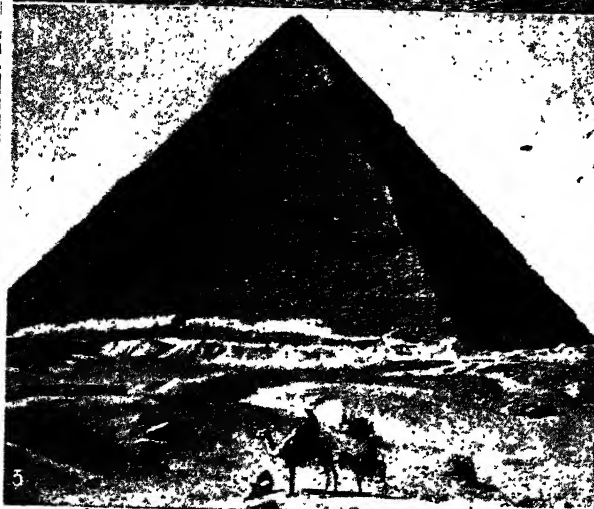
The present step-like appearance of this pyramid results from the demolition of the casing. The original height was proportioned to the circuit of the base as the radius of a circle to its circumference, the dimensions being 7 and 44 times a unit of 25 cubits. This made the angle of slope in the finished pyramids 50° to 55° , whereas in its present uncased form Medium has reverted to 75° , the normal angle of slope of mastaba-tombs.

Seneferu's successor Khufu (Cheops) produced the great pyramid of Gizeh, the only one of the "seven wonders of the world" still extant, and the most stupendous work of human hands. The proportions repeated those of Medium, the unit being lengthened to 40 cubits. This gave a height of 481 ft., a base line of 775 ft., and a volume of 88,500,000 cub. ft. of masonry, weighing 6,840,000 tons. It comprised 2,300,000 blocks averaging $2\frac{1}{2}$ tons apiece, piled in 210 horizontal courses upon $12\frac{1}{2}$ acres. The disappearance of the casing blocks enables modern tourists to clamber over the 3 ft. courses to the truncated summit. The entrance, 48 ft. up the N. face, was sealed by a block protecting a system of passages to three main chambers. From the entrance a passage descends to an unfinished chamber $101\frac{1}{2}$ ft. below the plateau level. This was abandoned, and an ascending passage formed at 60 ft. from the entrance. Thence a horizontal gallery diverged to the so-called queen's chamber, perhaps utilised for the statue of the king. The upward ascent, enlarged into a grand gallery, leads to the king's chamber, containing a granite sarcophagus, now lidless. This chamber was lined and roofed with massive granite blocks, floated downstream from Assuan.

Herodotus and Diodorus described the reputed methods pursued by the pyramid-builders. Khufu was computed to have employed 100,000 men during the



Pyramids. Sectional views of the Second and Third Pyramids of Gizeh, showing the extent of the excavations and the portion removed in the attempt to reach the sepulchral chamber of the Third Pyramid



1. Great Pyramid, of Cheops, and the Sphinx, from the S.E. 2. Entrance to the Great Pyramid, 48 ft. from the ground on the N. side. 3. Second pyramid, of Khafra, showing the remaining incrustation of limestone slabs

on the upper courses. 4. N.E. corner of the Great Pyramid, where the ascent is usually made. 5. Third pyramid, of Menkaura. 6. Main passage which leads to the sepulchral chamber of Cheops, in the Great Pyramid

PYRAMIDS: SEPULCHRAL MONUMENTS OF THE ANCIENT EGYPTIAN KINGS



Pyramids of Gizeh, from the south. Behind the three small pyramids stands the Third Pyramid, on its right the Second, and beyond that the Great Pyramid

three months of the inundation for 20 years. Traces remain of the quarry road over which the limestone blocks were hauled from Tura, 9 m. away, and then poised in position over temporary earthen ramps. The stonecutters and masons, doubtless employed all the year round, used saws up to 9 ft. long, and for hollowing out the sarcophagi tubular drills, all with fixed cutting points.

The second Gizeh pyramid, erected by Khafra, was 454 ft. high, with a base of 708 ft., and two tomb-chambers on or below ground level. The third, Menkaura's, was 219 ft. high, with a base of 356½ ft. Menkaura also set up a brick pyramid at Dahshur. At Abusir and Sakkara stand the pyramids of Vth and VIth dynasty kings. Those of Unas and his immediate successors at Sakkara bear upon their chamber walls hieroglyphic inscriptions, the so-called "pyramid texts" which were embodied in the Theban Book of the Dead. These Old Kingdom sepulchres were imitated during the XIIth dynasty, mostly with cores of air-dried brick, at Lisht, Dahshur, Illahun, and Hawara, near or within the Fayum.

Much controversy has arisen over the manner of planning the dimensions of these monuments. Lepsius argued that each king began his reign with a nucleus plan, regularly enlarged as the reign lengthened. Petrie regards such a method as disproved by the position of the galleries. A view

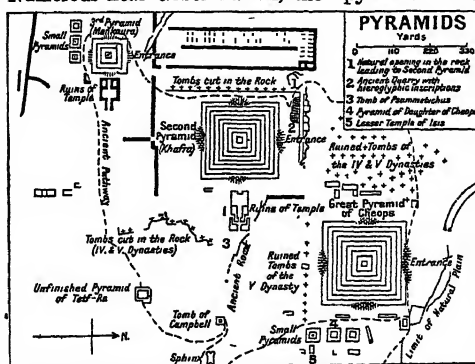
much favoured is that most pyramids were planned in a moderate size, and never altered, but that the multiple chambers in the three largest examples point to plan-revision, once or twice only, during the reigns of their builders.

Pyramidal tombs, about 30 ft. high, were erected over the remains of nobles and high officials. Pyramids form part of some XIth dynasty structures at Thebes, but never as independent sepulchres. Monolithic memorials of New Empire priests and judges assumed the form of miniature pyramids, with scenic reliefs. During the New Empire the pyramidal form was simulated in Nubia by chambered sepulchres above ground, usually with porticoes, steep-pitched sides, and flattened tops. Numerous near Gebel Barkal, the

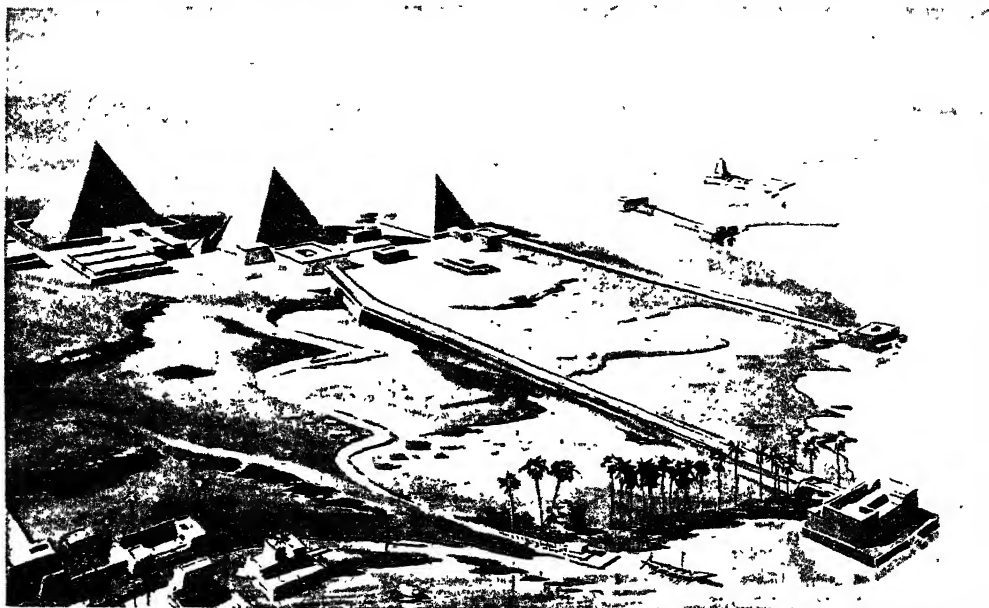
ancient Napata, they nowhere exceed 60 ft. in height. At Meroë there are about 200, including those of Candacë queens down to the 2nd century A.D.

The Egyptian pyramid-tomb was never naturalized by the nations around. The geometrical form influenced Phoenician architecture, and became fashionable in Augustan Rome, as in the marble-faced concrete pyramid of Cestius, 116 ft. high, within the Aurelian wall. Earthen tumuli and stone cairns, raised in many parts of the world, with roundish outlines, are related only remotely to the Egyptian form of four plane faces sloping to an apex. This quadrangular shape marks some pyramidal mounds of early Chinese emperors. Prehistoric truncated pyramids also occur in Tonga,

Tahiti, and other Pacific islands, and became characteristic of the advanced Maya and Toltec architecture of pre-Columbian America. See Dongola; Egypt; Mastaba; Teocalli; consult Pyramids and Temples of Gizeh, W. M. F. Petrie, 1883; The Nile, E. A. Budge, 10th ed. 1907; The Pyramids of Egypt, I. E. S. Edwards, 1947.



Pyramids. Plan showing the relative positions of the Pyramids of Gizeh and the adjacent ruins



Pyramids. Reconstruction of the Pyramids of Abusir as they were built by the kings of the Vth dynasty, c. 3500 B.C. Based upon the beautiful reconstruction by Herr Borghardt, the German Egyptologist, in his "Grabdenkmal des Königs Ne-user-ra"

Pyramids. Game played on a billiard-table. Fifteen coloured balls are arranged in the form of a compact pyramid, or triangle, the ball forming the apex of the triangle resting on a spot, called the pyramid spot, midway between the centre spot and the billiard spot on the table, and the base of the triangle towards the top cushion. The game is usually played by two persons, although sides of any convenient number can be formed, who use a sixteenth white ball alternately. The game consists entirely of winning hazards, the object being to pocket more of the coloured balls than one's opponent.

The order of play having been determined, A plays from the D at the coloured balls. If he pockets one or more he continues his innings, playing from where the white ball stops until failure occurs, when it is B's turn to proceed. Should a player pocket the white ball one point is deducted from his score, and a coloured ball previously pocketed is placed on the pyramid spot, or, if that is occupied, as near to it in a straight line from the top cushion as possible. If the striker who runs in, i.e. pockets or loses the white, has not previously scored a red ball, he is said to owe one, and the next ball he takes is replaced on the table, the stroke not counting to him, except that his penalty is nullified. When all the coloured balls but one have been pocketed, the white is used by the first striker as the cue ball,

and the coloured one by his opponent. Should either player then run in a pocket, or give a miss, it counts to his opponent, and the game is over.

As played by leading professionals it gave great scope for skill. Their method, usually, was to pay very little attention to scoring during the early stages of the game, but to manoeuvre until an opportunity presented itself of taking several balls in an innings. In this connexion it is recorded that in a private match the late William Cook and the (then) younger Roberts played for two hours, at the end of which period both were owing three balls. There was once a professional pyramid championship. The last time it was contested was at the Guildhall Tavern, London, in March, 1875, when the late W. Cook defeated D. Richards. See Billiards; Snooker.

Pyramids, BATTLE OF THE. Battle fought near Embabeh, Egypt, in which Napoleon Bonaparte defeated the Mamelukes under Murad Bey, July 21, 1798. The Egyptian forces, totalling about 37,000, were drawn up between the Nile and the Pyramids of Gizeh, with a smaller force of 1,000 Mamelukes under Ibrahim on the further river-bank. Soon after dawn Bonaparte's five divisions, in square formation, advanced. In spite of a furious Mameluke charge against Desaix's division, the French routed their enemy, captured Embabeh, and

drove its defenders into the river. Many escaped by swimming, but over 1,000 were drowned and 600 killed. The French losses were light, and two days later Bonaparte entered Cairo. Before this battle Bonaparte, addressing his troops, is believed to have used the famous phrase, "Soldiers, remember that from these Pyramids forty centuries look down upon you!" See Egypt: History.

Pyramus. In Babylonian legend, a youth who loved a maiden named Thisbe, and, their parents refusing consent, used to talk with her through a chink in a wall. Having resolved to marry, the pair agreed to meet under a mulberry bush by the tomb of Ninus, and flee together. Thisbe reached the rendezvous first, but was frightened away by a lion. Pyramus then arrived, and finding a veil which Thisbe had dropped, stained by contact with the lion's gory jaws, concluded that she had fallen a victim to the brute, and killed himself with his own hand. Thisbe, returning to find Pyramus dead, killed herself also. In memory of the tragedy the fruit of the mulberry was red ever afterwards. The story is told by Ovid in his *Metamorphoses*, and is made use of by Shakespeare in *A Midsummer Night's Dream*.

Pyargyrite (Gr. *pyr*, fire; *argyros*, silver). Sulphide of silver and antimony ($3 \text{ Ag}_2\text{S} \cdot \text{Sb}_2\text{S}_3$), containing 60 p.c. silver. Dark red to black, it is a valuable silver ore.

Pyrazole. Organic chemical with a carbon-nitrogen ring structure formed by the action of hydrazine on epichlorhydrin in the presence of zinc chloride. No member of the pyrazole series is known to be formed in nature. Pyrazole is a weak base of great stability. Its most important derivative is antipyrine, a febrifuge extensively used in medicine.

Pyrenees (Fr. *Pyénées*; Sp. *Pirineos*). Mountain range of S.W. Europe, dividing France from

peaks are found in the central section. Next to the Maladetta or Pic de Néthou (*q.v.*), the loftiest crests are the Pic des Possets (11,047 ft.), Monte Perdido (10,997 ft.), Vignemale (10,794 ft.), Marboré (10,673 ft.), Pic du Midi (9,466 ft.), and Canigou (9,137 ft.). Apart from the highroads and rlys. from Bayonne to San Sebastian, and from Perpignan to Figueras, there are only two carriageways across the Pyrenees, though there are some fifty footways. The oldest

pass, on the Roman road from Saragossa to Oloron, is the Col de Somport, via Jaca and Canfranc; the other, the Col de la Perche, leads from Villafranche to the Segre valley. One of the most frequented is that from St. Jean de Pied de Fort to Pampeluna. The pass from Perpignan to Figueras was traversed by

France and Spain. The treaty of Westphalia had put an end to the European war except as regards hostilities between these two countries, and in 1659 Mazarin met the Spanish minister on the Isle of Pheasants in the Bidassoa, just beneath the Pyrenees.

The treaty signed there provided for mutual restorations of territory, and the Pyrenees became the boundary between the two countries. See France; History.

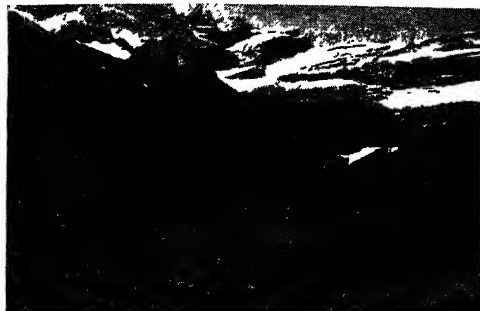
Pyrenées-Orientales. Southern dept. of France. Its area is 1,598 sq. m. Bounded S. by Spain and E. by the Mediterranean, its chief rivers are the Ariège, Aude, Tet, Tech, and Agly, and it includes Mont Canigou (9,137 ft.), the most easterly peak of the Pyrenees. There are several lakes, the most important being the Étang de Leucate. Iron, copper, lead, and granite are mined, choice fruits are grown, and the vines yield red and muscatel wine. Perpignan is the capital. Until the Revolution the dept. was partly in Roussillon and partly in Languedoc. Pop. 228,776.

Pyrethrum OR FEVERFEW. Name for several species of *Chrysanthemum*, esp. the gold feather (*C. aureum*). A native of the Caucasus, it was introduced to Great Britain in 1804. It is a perennial herb, about 2 ft. high, with aromatic yellow leaves cut into incised lobes, and daisy-like white flowers with yellow centres. It is largely used for carpet bedding and edgings, and is therefore grown as an annual to obtain small plants, which are frequently nipped to keep them dwarf. Some species are used in insecticides (*q.v.*), Kenya being the principal source.

Pyrgos. Town of Greece, capital of the dept. of Elis. Situated on the N. of the Gulf of Arcadia, W. Morea, it is about 50 m. S.S.W. of Patras, with which it is connected by rly. The local products, currants, grapes, and oranges, are exported through Katakolon by rly. 12 m. E. are the ruins of Olympia. Pop. 19,336.

Pyridine. Colourless liquid with a characteristic pungent odour extracted in quantity from coal tar. It is also present in considerable quantities in bone oil. Pyridine is used as a denaturant for alcohol (see Methylated Spirits), as a solvent in the rubber, paint, and varnish industries, and to some extent as a remedy for asthma. It is present in tobacco smoke.

Pyrite, OR IRON PYRITES. Widely distributed form of iron sulphide (FeS₂). Occurring as brassy-yellow



Pyrenees. The Cirque de Gavarnie, one of the cirques which are a peculiar feature of the Pyrenees, each with its hollow, or amphitheatre, carved out by glacier erosion

Spain. Extending from Cabo de Créus on the Mediterranean to Fuenterrabia on the Bay of Biscay, its length is 270 m. and breadth between 25 m. and 90 m. The W. continuation of the mt. system which runs almost due W. along the Biscayan borders of Spain is known as the Cantabrian Mts.

The highest point of the Pyrenees proper reaches an alt. of 11,168 ft. in Mt. Aneto or Pic de Néthou. The mean height is only 3,930 ft. for the whole range; the highest peaks are not on the axis, but rise from great transverse ridges, which, with the numerous valleys running at right angles to the chain, constitute one of its chief features. The line of perpetual snow is high, ranging from 8,800 ft. on the N. side to 9,200 ft. on the S. Another peculiarity is the great, deep, water-worn gullies, called cirques (Sp. *ollas*, pots), such as the cirque of Gavarnie (*q.v.*). Towards the Atlantic the average alt. decreases, and by the shores both of the Bay of Biscay and of the Mediterranean a low, fairly level tract admits of easy passage between France and the peninsula.

The Pyrenean chain is sometimes divided into three sections: the Central Pyrenees between the Pic des Escaliers and the Col de la Perche, and the Western and Eastern Pyrenees, lying either side of these points. Most of the highest

Hannibal in 218 B.C. An international rly. line runs through the tunnel of Canfranc.

In this mainly granite formation there are signs of volcanic upheaval, and there are strata of Silurian deposits and Cretaceous limestones of the Eocene period. Copper, silver, lead, coal, lignite, and iron are found. The mines of the Pyrenees were known to the Carthaginians and Romans, and several are still worked. Thermal and mineral springs abound. Noted resorts close to or on the mountains are Gavarnie, Pau, Cauterets, Tarbes, Lourdes, Bagnères-de-Bigorre, Luz, and Bagnères-de-Luchon. Of rivers with their source in the Pyrenees, the chief are the Aude, Garonne, and Adour on the N., and the Aragon, Segre, Llobregat, and Noguera on the S. There are many forests of fir, pine, box, and, on the lower slopes, evergreen oaks. Plants grow up to a line some 500 ft. higher than in the Alps. Wild animals include the bear, lynx, wild cat, chamois, wolf, boar, deer, and ibex. Generally speaking, the Franco-Spanish frontier coincides with the line of the highest peaks. The tiny republic of Andorra (*q.v.*) lies within the range. Consult The Pyrenees, H. Belloc, 3rd ed., 1923; Pyrenean Festivals, V. Alford, 1937.

Pyrenees, PEACE OF THE. Treaty signed in Nov., 1659, between

low cubes, grains, or masses, it often contains small quantities of nickel, cobalt, copper, and gold. Pyrite is occasionally a constituent of igneous, sedimentary, and metamorphic rocks. It is common in mineral veins and may be present in such abundance that it is mined for copper or gold. Its sulphur content is used in the form of sulphur dioxide, sulphuric acid, or as sulphate in the preparation of wood pulp, fertilisers, preservatives, etc. See Chalcocopyrite.

Pyroclastic Rocks. Group of rocks formed by the consolidation of volcanic ashes, bombs, and ejected blocks. They are commonly associated with lavas, or may occur interbedded with normal sediments after they have been blown by the wind far from their source of origin. They vary in degree of fragmentation from chaotic assemblages of great blocks to fine dust. The very coarse are referred to as agglomerate or volcanic breccia; finer varieties are called tuffs or ashes. See Volcano.

Pyrogallol. Tri-hydroxy-benzene ($C_6H_3(OH)_3$), usually known as pyro, once the most popular photographic developing agent but now less commonly used. Its rapid oxidation properties and ability to produce a deeply stained image are sometimes advantageous where there is known to be under-exposure. Its properties were discovered by Maddox in 1871.

Pyroligneous Acid. Name given to crude acetic acid (*g.v.*), obtained by the destructive distillation of wood. Pyroligneous acid is sometimes sold as essence of smoke, and is used for imparting to hams and bacon a smoky flavour.

Pyrolusite (Gr. *pyr*, fire; *lousin*, to wash). In mineralogy, the name given to manganese dioxide. Nearly black to steel-grey in colour, with a metallic lustre, it is one of the common ores of manganese. It is used as a colouring material, and in the manufacture of chlorine and oxygen and manganese alloys. See Manganese.

Pyromancy (Gr. *pyr*, fire; *manteia*, divination). Divination by fire, practised in classical times and probably much earlier. The movements of the flame and the forms assumed by the embers were noted, and omens deduced from them. See Divination; Magic.

Pyrometer. Instrument for measuring temperature. The simplest form is a mercury thermometer, though, usually, the term is used only to describe instruments for measuring higher or lower temps. than those measurable with

a thermometer. Some pyrometers are operated by expanding metal or gas, others electrically, some optically, and some by the melting of various materials.

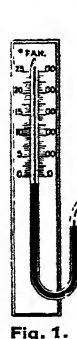


Fig. 1.

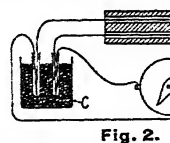


Fig. 2.

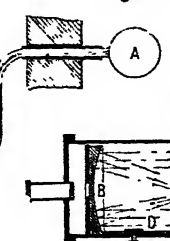


Fig. 3.

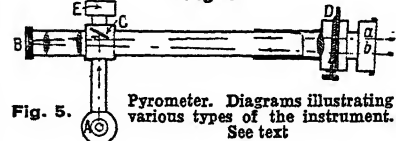


Fig. 4.

Fig. 5. Pyrometer. Diagrams illustrating various types of the instrument. See text.

Expanding metal pyrometers are sometimes used when a high standard of accuracy is not required, and the maximum temp. is not above $1,200^{\circ}\text{C}$. There are two types: (a) those in which two separate bars of dissimilar metals are heated side by side and the difference in thermal expansion between them is amplified to an indicator through a gear train; and (b) those in which a bimetallic strip or coil is heated and unequal expansion of the two metals causes bending of the strip, or a change in length of the coil; the change, amplified through a gear train, is recorded on an indicator.

Volumetric change in a gas is used, occasionally, to measure a change in temp. The arrangement is shown in Fig. 1, in which A is the gas bulb exposed to the varying temp. Any change in temp. results in a change in volume of the gas which is shown by a change in the levels of the liquid contained in the U-tube, one branch of which is connected to the bulb, and indicated by a graduated scale, against which the remaining arm is held, as shown.

The commonest electrical pyrometer has a thermocouple, the operation of which is based on two facts: (a) if two dissimilar metals are in electrical contact, then there will be a potential difference between them, which will vary with

the temp., and (b) if a length of metal wire is hot at one end and cold at the other, there will be a potential difference, between the ends, which will vary with temp.

Two equal lengths of wire are taken, each made from a different metal, one of which tends to increase and the other to decrease in potential as the temp. rises (e.g. chromel and alumel respectively). One pair of ends, to be exposed to the temp. which it is desired to measure, is welded together and called the "hot junction".

The separate ends are maintained at a constant standard temp. and are connected to the terminals of a galvanometer or millivoltmeter. The potential differences will be cumulative and indicated

on the recording instrument. Any change in temp. at the couple end will produce a change in potential, from which the actual temp. can be estimated. The arrangement is shown diagrammatically in Fig. 2. The thermocouple wires A are mounted in a protective sheath B, with the couple exposed and the remaining lengths of wire carefully insulated from each other. The cold junction ends are carried into C, an ice-box or other temp. compensating device, before connexion to D, the galvanometer or millivoltmeter. This type of pyrometer, which measure temps. up to $1,600^{\circ}\text{C}$., is used specially for measuring low temps. e.g. that of the stars in astronomical observation.

A very simple electrical pyrometer is illustrated in Fig. 3. This measures the change in electrical resistance of a metal wire as it varies with the temp. A is a double coil of platinum wire, on a heat resisting former B, enclosed in a protective sheath C. D is a resistance measuring bridge which can be mounted at any convenient distance away from the resistance wire, so the leads are shown broken at x and y.

The optical-electric pyrometer is shown in Fig. 4. A, shown as a thermophile, could be a thermocouple or a photo-electric cell, on which beams of radiant heat a, b, c, d, e, f, are focused by the opti-

cal system B. The optical system is adjusted by the screw D. Changes in potential are indicated by C, the galvanometer or millivoltmeter.

Optical pyrometers are used to measure temps. of more than 750° C. and depend on the changes in colour and brilliancy which take place on a body as its temp. changes. From the changes, measured accurately by a photometer, the temp. is estimated. One scheme is shown in Fig. 5, in which *a*, *b*, are rays from the heat source. These are passed through adjustable filters D and viewed, through optical system B, side by side with a standard light from a source A reflected in mirror C, which can be adjusted at E. In operation the filters are altered until the radiations look of the same intensity and colour as the standard, upon which the temp. can be read from a graduated scale on the filters.

In the hot wire, or disappearing filament, pyrometer the radiations are viewed through an optical system which includes a filter, to prevent dazzle, and an electrically heated filament interposed in the path of the rays. The electric current is varied until the filament is invisible against the background of the radiations. The magnitude of the current gives a measure of the temperature of the source of the radiations.

J. G. Tweeddale, A.M.I.Mech.E.

Pyrope. Blood-red variety of garnet; chemically a magnesium aluminium silicate. Alternatively named precious garnet, it is found in basic igneous rocks of the serpentine and peridotite groups; also in detrital deposits, as in Ceylon. When transparent, pyrope is cut as a gemstone, and though it is usually of small size, large specimens have been found. Those obtained in the diamond fields of S. Africa are known as Cape rubies, but are easily distinguished from genuine rubies by their optical properties.

Pyrophorus. Substance which takes fire on exposure to air. Homberg (1662-1715) discovered that if he heated together in a tube a mixture of lamp black, alum, and flour, the charred mass caught fire on being shaken out of the tube. In the same way sulphides of potassium, sodium, and lithium can be prepared, which take fire on exposure to air. Pyrophoric iron and lead are also known, the latter being made by charring lead tartrate. The pyrophoric iron used in pocket lighters is an alloy of iron and cerium. When struck or rubbed this alloy gives off brilliant

sparks, which in pocket lighters are made to ignite petrol vapour.

Pyroxene. In mineralogy, the name given to a group of silicates which are important rock-forming minerals. They are generally silicates of calcium and magnesium, but may also contain iron, aluminium, chromium, manganese, zinc, etc. The chief pyroxenes are augite, an aluminium pyroxene; diopside, a calcium manganese, white, grey, yellow, or green in colour; hedenbergite, a calcium-iron pyroxene, black in colour. The pyroxenes are constituents of limestone gneisses and igneous rocks, particularly the latter, and some are cut and polished as gemstones. See Augite; Diopside.

Pyroxylin. Alternative name for nitrocellulose (*q.v.*), and particularly for the soluble variety used for the preparation of collodion, in pharmacy, for making lacquers and photographic film, and in applications outside explosives.

Pyrrho (d. c. 275 B.C.). Greek philosopher, founder of the first school of Sceptics. He was a native of Elis, and accompanied Alexander on his Indian campaigns. His chief doctrines were: We can know nothing of the real nature of things, since the contrary of everything that appears true may be equally true; we must therefore withhold our judgement and, whatever happens, preserve our imperturbability of mind, which alone brings happiness. Virtue is the only thing that really matters; all external things are indifferent.

Pyrrhotite. In mineralogy, iron sulphide with excess sulphur. Often it contains nickel, sometimes up to 5 p.c., and constitutes the most valuable ore of nickel. Generally it is found as reddish-brown to coppery metallic masses in veins and magmatic segregations. The most important deposit is that at Sudbury, Ont., the world's largest nickel producer.

Pyrrhus (318-272 B.C.). King of Epirus, and one of the most noted generals of ancient times. His father Aeacides having been deposed, Pyrrhus lived for some years under the protection of an Illyrian chief named Glaucias.

When 12 he was restored to the throne of his father, but in five years' time, owing to the intrigues of Cassander (*q.v.*), he was again in exile. Taking service under Antigonus, he found himself a hostage of the Egyptian king Ptolemy, when his patron had been defeated at the battle of Ipsus, 301 B.C. Ptolemy assisted Pyrrhus to recover his father's

throne and gave him his daughter in marriage. Consolidating his position as king of Epirus, Pyrrhus endeavoured to extend his dominions, chiefly at the expense of Macedonia, and for a time was in actual possession of the whole of that country; but in 286 was beaten at Edessa and driven out.

In 281 B.C. the inhabitants of Tarentum in southern Italy, who were then at war with Rome, appealed to Pyrrhus for help, and he appeared in Italy with a considerable army. The Romans were defeated in battles at Heraclea, 280, and Asculum, 279, but at such cost in life that the term "Pyrrhic victory" has passed into a byword. An invitation from the Sicilian Greeks for assistance against the Carthaginians took Pyrrhus over to Sicily in 278, his lieutenant Milo being left in command at Tarentum.

The Sicilian campaign was at first successful, but finding himself handicapped by the lack of unanimity among the Sicilian cities, Pyrrhus in 276 returned to Tarentum. His last battle with the Romans took place at Beneventum in 275, and resulted in a severe defeat. His resources failing, he returned to Epirus, but before long was again engaged in schemes of conquest. After failing to take Sparta, he attacked Argos, but in the street fighting in that city he was killed by a tile thrown from one of the houses by an old woman. A romantic figure, he was mainly an adventurer, but merits applause for his clemency and for the splendid discipline of his troops.

Pyrrhus, or Neoptolemus, was also the name of a legendary character: the son of Achilles, and the slayer of King Priam when the Greeks took Troy.

Pyrus. Genus of trees of the family Rosaceae. See Apple.

Pyruvic Acid. Organic liquid acid, with an odour resembling meat extract and acetic acid. It is also called pyroracemic acid, because it is produced by the distillation of racemic acid, an isomer of tartaric acid. Lactic acid is formed by the action of nascent hydrogen on pyruvic acid.

Pytchley. Famous English hunt. It hunts a stretch of country in Leicestershire and Northants, from Market Harborough to Northampton, the district being about 20 m. from N. to S., and 25 from E. to W. The kennels are at Brixworth. Founded about 1750, it had Earl Spencer as first master, and later squire have been among its leading supporters. In 1827-34

Squire Osbaldeston was master. The Woodland Pytchley is an offshoot of the Pytchley, having been established in 1874 for sport in country N. and E. of that now hunted by the older pack. The kennels are at Brigstock. Both packs are the property of the members. Consult *The Pytchley Hunt*, Nethercote, 1888. *Pron.* Pie-chly.

Pythagoras (b. c. 582 B.C.). Greek philosopher. Born at Samos, he settled at Crotona, in Italy,



Pythagoras,
Greek philosopher

about 529 B.C., having probably made journeys in Egypt. He founded a school or society, half-religious, half-philosophical. His disciples were bound by the strictest rules, underwent a comprehensive training in gymnastics, mathematics, and music, practised vegetarianism, and believed in immortality and the transmigration of souls. The mystic side of his philosophy seems to have been derived by Pythagoras from the hymns attributed to the mythical Orpheus, and also perhaps from his travels in Egypt.

Like the philosophers of the Ionian School, Pythagoras attempted a scientific explanation of the universe in terms of some one thing, but whereas Thales taught that all substances are variants of water, and Heraclitus that they were variants of fire, Pythagoras found the *arché*, or first principle, of the universe in number—which, he taught, determined the harmonies of music, the proportions of architecture, the movements of the sun, moon, and stars, and the harmonies of the spheres.

From these foundations it was easy to identify number with everything that is orderly, proper, right, good, and beautiful. Pythagoras is regarded as the real founder of the science of geometry, and also as the discoverer of the musical octave. The proof of the famous 47th proposition of Euclid (namely, that in a right-angled triangle the square of the hypotenuse is equal to the sum of the squares of the other two sides) is attributed to him. The body of doctrine he taught was carefully conserved by his followers and had great influence upon speculative thought. The philosophy of Plato is much indebted to Pythagoras.

Pytheas (4th century B.C.). Greek geographer and astronomer.

A native of Massilia (Marseilles), he navigated the coastal waters of Europe from Gades (Cadiz) as far as Thulé, probably the Orkneys and Shetlands, and published the result of his expedition in works only fragments of which remain. Pytheas calculated the height of the sun by observing in his native place the relation of the gnomon to the length of its shadow at the time of the summer solstice, and is said to have been the first to connect the spring tides with the phases of the moon.

Pythia. Priestess of Apollo, who gave the responses at the oracle of Delphi or Pytho.

Python. In Greek mythology, the serpent born of the mud left by the flood which overwhelmed the world in the time of Deucalion (q.v.). This serpent was killed on Mt. Parnassus by Apollo with his bow and arrows, and the Pythian Games were supposed to celebrate this victory. See *Leto*.

Python. Genus of large serpents found in the tropical parts of the E. hemisphere. They belong to the boa family, and are distinguished by the structure of the skull. None of them has poison fangs, but the jaws carry numerous sharp curved teeth. The backward curve of the teeth makes it impossible for the victim to tear himself away.

But the conspicuous characteristic of the pythons is their great size. Usually they range from



Python. 1. Portion of Indian python showing, at A, spur or vestige of pelvic girdle. 2. Lower and, above, upper jaw of Indian python. 3. Coiled specimen
W. S. Berridge, F.Z.S.

15 to 20 ft. in length, and have been known to attain 30 ft., with a thickness of body in proportion. They kill their prey by constriction with the coils of the body, by which means the bones of the victim are broken and the entire body crushed and elongated for swallowing. Pythons live among trees near water, and capture their prey—small deer, goats, and other animals—by night. The female has the unusual habit of incubating her eggs, lying coiled about them for some eight weeks.

There are numerous species, all handsomely marked and mottled. See *Animal*, colour plate; *Snake*.



Pyx (Gr. *pyxis*, box). Vessel in which the Blessed Sacrament is reserved for administration to the sick. The word is found in a decree of Pope Leo IV (c. 850), ordering that nothing shall be placed above the altar save the pyx, and in early times the pyx




was kept suspended above the altar. Later it was kept in the locked tabernacle on the altar. The pyx is usually of vase form.

Pyx, TRIAL OF THE. Periodical testing of gold and silver coins issued by the English mint. The practice

dates from the time of Henry II, and undoubtedly originated in the testing of coins made for the king by private contractors. The coins are now tested annually, as a rule by persons selected from the Goldsmiths' Company, the practice being that (formerly) one gold coin out of every 2,000 minted and one silver coin out of every 60 lb. troy of silver was put aside in the pyx or box for the purpose. The trial takes place in the hall of the Goldsmiths' Company, London. See *Mint*.

THE letter Q has altered very little in its shape since its forerunner in the Semitic alphabet of 1100 B.C.  or , known as *qoph*. There is considerable divergence of opinion as to the meaning of this word. It is variously said to denote eye, ear, needle, opening, knot, and ape. It was pronounced with a *k* sound, uttered from the back of the throat. The Phoenician alphabet adopted both the symbol and the sound, and there were early Greek forms. The classic Greek alphabet discarded it as a letter, however, using only the *kappa* for all forms of *k* sound (see K). The symbol, in the modified



form  (*koppa*), was ultimately used as a numeral for 90. Early Latin (800 B.C.) used this modified symbol as a letter in combination with V to represent the *kw* sound, as we invariably combine Q and U in English. The flowing tail to the letter was evolved from Roman penmanship, and the resemblance of the capital letter to the figure 2, stressed in some forms of handwriting even today, arose from the practice of beginning to describe the circle from the bottom, so as to finish at the tail stroke without taking pen from paper. The derivation of the minuscule *q* is, as usual, due to speed in writing.

Q Seventeenth letter of the English and Latin alphabets. It has the sound of hard *c* (*k*), and in English is always accompanied by *u*, the combination being pronounced as *kw*. Qu also has the simple *k*-sound, especially in French and other foreign words, and in the termination *-que*, as in *grotesque*, *opaque*, where *e* is mute. *Quay* is pronounced *kee*. See Alphabet; Phonetics.

Q. Symbol used for supposed source (Ger. *Quelle*) of the Gospels of Matthew, Mark, and Luke. See Bible.

Qattara Depression. Low-lying area of ground in the N. Libyan desert with a maximum depth below sea-level of about 400 ft. It has an area of 7,500 sq. m., and is bounded on the N. by a steep escarpment of which the scarp face is over 600 ft. in height. The depression protected the left flank of the British line and the right of the German-Italian forces in the battle of Alamein, 1942.

Q-Boat. Name given in the First Great War to a ship used to trap submarines. Also known as mystery ships, Q-boats carried concealed guns that could be unmasked by dropping a flap or letting down the sides of a deck-house.

In equipping a Q-boat all kinds of camouflaging devices were employed to conceal wireless aerials, look-out posts, etc. The boats masqueraded as merchant vessels.

Qisaraya. Coastal village of Palestine, the ancient Caesarea. It is 32 m. N. of Jaffa and close to the Haifa rly. It was founded by Herod, 13 B.C., on the site of an earlier city, and then contained temples and an amphitheatre, as well as a great breakwater, since destroyed, which made a good harbour. Paul spent his two years' imprisonment here. The city became the military headquarters of Palestine, and here Vespasian was proclaimed emperor in A.D. 69. After the fall of

Jerusalem it became the capital of Palestine. In 1102 it was taken and despoiled by the crusaders, and the ancient city was destroyed by the Egyptian Beibars in 1265. The modern village, built on the site, is mainly of value as a port of call for vessels needing water.

Quack. Term used generally for one who falsely professes knowledge—especially medical knowledge—and more strictly for one who disingenuously puffs worthless remedies. The word is an imitation of the noise made by a duck, and alludes to the chatter with which a quack vaunts his skill. It was formerly used for medical impostors only, but was later applied to any charlatan (*q.v.*). In the 20th century it tended to be applied to any medical practitioner not recognized by the General Medical Council. The original form of the word was "quacksalver," one who "quacks" or gabbles in praise of his "salves," ointments, or remedies.

Quadragesima (Lat. *quadragesimus*, fortieth). Latin name for Lent, or for the 40 days' fast before Easter. It denotes the first Sunday in Lent. In the English Prayer Book the word is only used in the Tables and Rules.

Quadrangle. Rectangular or nearly rectangular court enclosed by buildings. The quadrangle was a conventional feature of monastic architecture, the cloisters being a special feature, and was adopted for colleges and large houses; for the latter notably in the Tudor period, as at Hampton Court and Compton Wynyates. At the universities the abbrev. "quad" is applied to the courtyards of colleges even when these are not completely enclosed. Tom Quad at Christ Church, Oxford, is one of the most famous.

Quadrant (Lat. *quadrans*, fourth part). In mathematics, a quarter of a circle: the area bounded by two radii at right angles to one another and that part of the circumference between

them; that part of a circular arc subtending an angle of 90° at the centre; or a circular sector of 90° angle. The distance from the pole to the equator forms a quadrant 6,213.7 m. in circumference.

Quadrant. Instrument for determining angular measurements. Originally designed for astron-



Quadrant formerly used in navigation
By courtesy of Negretti & Zambra

omers, it was later developed for navigation. It consisted of a limb or arc of a circle (90°) equal to the fourth part of the whole circumference, graduated into degrees and parts of degrees. The quadrant was defective owing to the impossibility of securing exactness of the whole arc, perfect stability of the centre piece, and concentricity of the centre of motion with the centre of division. It was superseded by the sextant (*q.v.*), in which the graduated limb is one-sixth of a circle. The quadrant electrometer is an electrostatic instrument invented by Kelvin for measuring differences in potential on the surface of an electrically charged conductor. See Electrometer.

Quadrat. In typography, piece of metal cast lower than the letters and used for spaces between them, and for filling out blank lines. It is usually abbreviated as quad.

In plant ecology, a small square of ground marked out to facilitate the study of the relative numbers and distribution of plants in it.

Quadratic Equation. In mathematics, equations which involve the second power of the unknown quantity. Every quadratic equation can be reduced to the form $x^2 + ax + b = 0$, where x is the unknown quantity and a and b the terms in which its value may be expressed. See Equation.

Quadratrix (Lat. *quadrare*, to square). In mathematics, name given to a type of curves the ordinates of which are a measure of the areas of other curves. One of the most famous of these curves is that called the quadratrix of Dinostratus. It is the plane locus of the intersection of a straight line revolving uniformly about a point and another straight line moving uniformly parallel to a given direction. It was realized that the construction of such a curve, one of the most ancient of transcendental curves, would enable the squaring of the circle, the duplicating of the cube, and the trisection of an angle to be accomplished, the three most famous geometrical problems of the ancients. The quadratrix of Tschirnhausen is a curve with similar properties.

Quadrature. In astronomy, the relative position of two heavenly bodies when their difference of longitude is 90°. The first quarter of the moon is its eastern quadrature, the last its western quadrature. Quadrature of an inferior planet with the sun is impossible, since its maximum elongation is less than 90°.

In mathematics quadrature is the finding of an area equal to a given area. It is usually restricted to the finding of a square equal in area to a given area. Squaring the circle (*q.v.*) was one of the three famous problems of antiquity. The area of any figure bounded by straight lines is easily found, since the figure may be divided into triangles, the areas of which were first demonstrated by Euclid. Areas of figures bounded by curves cannot in general be found. Where the equations of the curves can be stated in algebraic functions, however, the areas can be obtained by the calculus. See Mensuration.

Quadriga. Roman two-wheeled chariot to which four horses were harnessed abreast. It is of frequent occurrence in ancient sculpture, and a famous modern example is on Wellington Arch, at the W. end of Constitution Hill, London. Designed by Adrian Jones (*q.v.*), it was erected in 1912 to commemorate 100 years peace between the U.K. and the U.S.A.

Quadrilateral. Four-sided polygon. Particular kinds of quadrilateral are the square, parallelogram, rhombus, and trapezium. The word usually indicates a figure in one plane, a quadrilateral not in one plane being known as a *gauche* quadrilateral.

Quadrilateral (Lat. *quatuor*, four; *latus*, side). Name used for

four fortresses grouped for strategic purposes. Perhaps the most famous quadrilateral is the one in Lombardy and Venetia, composed of the fortified towns of Peschiera, Mantua, Legnago, and Verona, which enabled the Austrians to maintain their hold on N. Italy. Verona, commanding the Adige valley, allowed supplies to come from Austria, and Mantua was so strongly situated and fortified that it was long deemed impregnable. In 1848 Peschiera fell to the Italians, who then besieged Mantua, but they met with a reverse at Custozza and retreated. After the battle of Solferino, 1859, the French and Italians were bombarding Peschiera, when the peace of Villafranca terminated hostilities. In 1866 the Italians again attempted to capture the quadrilateral, but without success.

Quadrille (It. *squadra*, asquare). Dance which originated in the French ballets of the 18th century, and was later transferred to the ballroom. It is danced by four couples who stand in a square. The music consists of five parts: Le Pantalon, L'Été, La Poule, La Trénise, and Finale, the names being taken from old *contre-danses*. See Dancing.

Quadrille. Obsolete card game. It is an offshoot of *ombre* (*q.v.*), and is played by four persons with 40 cards, the 8, 9, and 10 of each suit being eliminated from the pack.

Quadrirème. Ancient war vessel. It was propelled by four banks of oars, one above the other. See Trireme.

Quadroon (Span. *cuarteron*; from Lat. *quartus*, fourth). Term applied generally to one who has one-fourth Negro blood—the offspring of a white and a mulatto. It is sometimes applied to a person who is fourth in descent from a Negro ancestor, provided that one of the parents in each generation has been white; the person who is third in descent being known as a *terceron*. The Spaniards early used the word for the offspring of a white and an Indian half-breed, and it is sometimes applied to similar crossings in other races, and also to animals and plants. See Negro.

Quadrumvirs. Title given to the four fascists who led Mussolini's march on Rome in 1922. They were Bianchi, Vecchi, Italo Balbo (*q.v.*), and Emilio de Bono (*q.v.*). Balbo was leader of the volunteer fascist army and de Bono commander of the militia. Vecchi became a monk after the fall of fascism.

Quadruple Alliance (Lat. *quadruplus*, fourfold). Alliance of four countries. Such was the treaty of 1718 by which Great Britain, the Netherlands, France, and the Holy Roman Empire signed an agreement to uphold the treaty of Utrecht against the aggressive policy then pursued by Spain. Another quadruple alliance was signed in 1834 by Great Britain, France, Spain, and Portugal, with the object of keeping Dom Miguel from the throne of Portugal.

Quadruplet. Musical term for an abnormal group of four equal notes. It is performed in the time of three or six of the same nominal value.



Quadruplets. Four young produced at a birth. Human quadruplets are rare, and in Great Britain only 15 sets were born between 1935 and 1948.

Quaestor (from Lat. *quaerere*, to ask, inquire). Magistrate of ancient Rome. Their number was originally two, but by the last period of the republic it had increased to 40. Under the empire the number was reduced to 20. At the inception of the office the quaestors had legal duties in connexion with inquisition into murder charges, but this function passed to the aediles and tribunes. Latterly, the quaestors were financial and administrative officers. The quaestorship was the lowest of the higher magistracies, whose holders were entitled to a seat in the senate after their year of office.

Quagga. Name formerly applied to a dark variety of zebra, once common in Cape Colony. It became extinct about 1870. The name was onomatopoeic, being the natives' reproduction (*quā-hā*) of the animal's barklike neigh "*quā-hā-hā*"; it was applied by them to zebras in general. It is now believed that the supposed *Equus quagga* was only a local race of the common zebra (*E. zebra*), Burchell's zebra (*E. burchelli*), or Chapman's zebra, with darker upper parts, the legs and under parts white and free from stripes, and the sides spotted. See Zebra.

Quaidi Azam. Title, meaning great leader, given in the dominion of Pakistan to its first gov.-gen., Mohammed Ali Jinnah (*q.v.*).

Quai d'Orsay. Thoroughfare in Paris running for nearly 2 m. along the N. side of the Seine, from the Champ de Mars to the Pont

Royal. The many government offices situated along it, including the foreign office, make it the Whitehall of France, and Quai d'Orsay is used at times as a synonym for the French government. *Pron.* Kay dorsay.

Quail (*Coturnix coturnix*). Small game bird about the size of a thrush. Closely related to the

pheasant and partridge, it is a native of Europe, Asia, and N. Africa. It is a fairly regular visitor, but in variable numbers, to the British Isles, breeding in many localities, mostly departing before winter. It is much like a diminutive partridge in shape and general coloration, and seeks its food under cover of the field crops. The nest is a slight grass-lined depression in the ground, and contains seven to ten brown-blotched, buff-tinted eggs. The alarm note is a "whit-whit-whit." Vast numbers are netted in the Mediterranean countries during the spring migration, and exported alive for food. There are five other species, natives of E. Asia, Australasia, and Africa. In 1937 it was made illegal to import live quails into the U.K.

Quain, SIR RICHARD (1816-98). British physician. Born at Mallow, co. Cork, Oct. 30, 1816, he became house surgeon at University College Hospital, London, 1840, and physician to Brompton chest hospital, 1855-75. In 1863 he was put on the general medical council, and was its president for 1891, and he was made a baronet. He was the editor of the Dictionary of Medicine, 1882, and died March 13, 1898.

Richard Quain (1800-87), his cousin, was president of the Royal College of Surgeons, 1868, and one of its original members. Jones Quain (1796-1865), another cousin, was author of Elements of Descriptive and Practical Anatomy, first published 1828 and long a standard work. The name Quain is perpetuated in chairs of physics and literature at London university.

Quakers. Popular name for the Society of Friends. Its original derisive reference to the bodily tremors of members of the society when moved by the Spirit in public worship has long disappeared. *See* Fox, George; Society of Friends.

Quaking Grass (*Brizia media*) or TOTTER-GRASS. Perennial grass of the family Gramineae. It is

a native of Europe, Asia, and Africa. It has creeping, underground stems and flat leaves. The flowering stems are much branched, and each of the flattened, oval, more or less purple and shining spikes is borne on a long, hair-like, trembling stalk. A smaller species (*B. minor*) has tufted stems, and is an annual. *See* Grass illus.



Quail, a game bird which breeds in the British Isles

Quality (Lat. *qualitas*, from *qualis*, of what kind?). In the widest sense, attribute as opposed to substance, all that can be affirmed of a being regarded as subject; in a narrower sense, a particular kind of attribute which leads to a

substance being included in a certain class. Qualities have been distinguished as primary, such as are found everywhere in matter (extension, solidity, figure, motion or rest, number), and secondary, such as are not necessarily inseparable from matter (colour, taste, warmth, smell), but depend upon the action of the primary qualities. In psychology, quality is the characteristic whereby one sensation is distinguished from every other.

Quality Street. Comedy by J. M. Barrie. Produced Sept. 17, 1902, at the Vaudeville Theatre, London, it had a run of 459 performances. The story, which is set in the early 19th century, deals charmingly with two sisters who are reduced to keeping a school. Ellaline Terriss, Marion Terry, and Seymour Hicks played the leading parts.

Quamash (*Camassia quamash*). Bulbous perennial of the family Liliaceae, native of N.W. America. It has narrow leaves about a foot long, and a stout flowering stem bearing a spray of six-parted blue flowers. After the plants have flowered, the natives dig up the bulbs and dry them by heat, when they are pounded into cakes for use as food.

Quandary Peak. Mountain of the U.S.A., in the state of Colorado. Situated in the Park range, it rises to 14,266 ft.

Quantity (Lat. *quantus*, how much?). Literally, the amount of anything. In metre it is the length of a syllable, a false quantity being an error in such length. In logic it means the extent of a conception, and in music the relative duration of a tone. In mathematics a quan-

tity is anything that can be increased or divided or measured. *See* Weights and Measures.

Quantity Surveyor. One who estimates from an architect's drawings the total quantity of materials required for a building, and draws out a list of the exact amounts of the respective materials for the builder to price them and the cost of the labour to carry out the work. The Institute of Quantity Surveyors is a professional society, incorporated 1936, with its headquarters at 98, Gloucester Place, W.1.

Quantock Hills. Range in Somerset, England. It trends for 8 m. N.W. from a point N. of Bishop's Lydeard to the Bristol Channel, 2 m. E. of Watchet. The culminating summit is Wills Neck, 1,262 ft. high.

Quantum Mechanics. This term was originally reserved for Heisenberg's form (1925) of the quantum theory. In a wider sense it now also includes Schrödinger's wave mechanics (1926). Forced by the experimental evidence of discrete spectral lines which point to discontinuous changes in the energy of emitting atoms, Heisenberg abandoned the commutative law of multiplication and postulated that with conjugate dynamical variables like coordinate q and momentum p in the same direction, $qp - pq$ does not equal 0, but 2π times Planck's constant h . This is, of course, only possible if q and p are not ordinary numbers, but more complex mathematical entities, e.g. matrices. Heisenberg showed that the energy values of the electron in the hydrogen atom turn out to be discretely spaced. Such a profound change in the conception of the nature of dynamical variables has far-reaching consequences. From the philosophical point of view the most important is Heisenberg's "uncertainty relation," which sets a limit to the accuracy with which two conjugate dynamical variables can be measured simultaneously, the product of the two uncertainties never being less than Planck's constant.

Other conclusions are more easily reached via Schrödinger's form of the theory. Schrödinger showed that just as in optics the description in terms of rays can be refined into a wave theory covering the finer phenomena of diffraction, so ordinary mechanics can be derived from a "wave mechanics" that accounts automatically for the quantisation of energy in the hydrogen atom.

Davisson and Germer demonstrated electron diffraction by crystals in 1927.

The physical interpretation of Schrödinger's theory is in terms of probabilities. When, for example, a wave crosses into a different medium it is partly reflected and partly transmitted. Similarly, of a beam of electrons striking an obstacle, a certain fraction is reflected and the rest transmitted. The finite probability that an electron bound in a metal may yet escape from it facilitates the well known thermionic emission while, with α -particles in atomic nuclei, this same important "tunnel effect" constitutes the natural radioactive α -decay. Direct use of the wave properties of electrons is made in the "electron-ray diagrams" of crystals and in the powerful electron-microscope.

Schrödinger's form of the theory also explains the nature and strength of the homopolar binding of two neutral atoms in the hydrogen molecule. In the presence of another atom the electron can no longer be thought of as definitely belonging to its own nucleus, there being a finite probability for the exchange of the two electrons between the two nuclei, which are thus kept together (exchange force). Similar forces which naturally lead to "saturation" are probably at play in the binding of protons and neutrons in the nucleus. A further postulate in this connexion is that in an atom no two electrons can be in exactly the same state of motion and spin (Pauli's exclusion principle). This principle is indeed at the very root of the periodic structure of the system of chemical elements, the erstwhile mystical numbers 2, 8, 16, 32 of the elements in the different periods simply being the four lowest values of the $2n^2$ with integral n , as required when the exclusion principle is conjoined with quantum mechanics.

Quantum mechanics has been successful in elucidating the structure and forces in atomic nuclei. Extension of its methods also gives a good account of the corpuscular properties of light (photo-electric effect). It has led to valuable results in the problem of the interaction of light and matter, and indeed of all known particles, albeit only to a degree.

Quantum Theory. Physical theory of radiation first enunciated by Max Planck (*q.v.*) in 1900. The classical theory, which assumed that the energy in electromagnetic waves was continuous and hence

could be subdivided indefinitely, failed to account for the observed distribution of energy in "black body radiation," or the heat and light waves emitted from a small hole in an otherwise closed cavity, at any particular temperature. Planck suggested instead that radiant energy could exist only in multiples of a small unit or quantum. All the quanta of a particular wavelength are identical, but the energy of these is directly proportional to the frequency of the radiation. Thus visible light has a frequency millions of times higher than the shortest wireless waves; hence the energy of its quanta is millions of times greater. The word photon (*Gr.*, light) is often used as a synonym for quantum, and photons are found to behave rather like the molecules of a gas, except that one photon cannot be distinguished from another. The mathematical expression of Planck's theory is contained in the statement $E=h\nu$, where E is the energy, h is Planck's constant equal to 6.55×10^{-27} joules per second, and ν is the frequency of the radiation.

Quanza. Variant spelling of the West African river Kwanza (*q.v.*).

Quarantine (*Fr. quarantaine*, period of 40 days). Period during which ships, goods, or persons coming from countries where infectious disease prevails are interdicted from communication with the shore. The term is derived from the fact that usually the period was made to cover 40 days. Originally instituted as a protection against the importation of plague, and later employed as a defence against cholera and yellow fever, quarantine in the old sense is now abolished in Great Britain, the Quarantine Act of 1825, which embodied the earlier regulations on the subject, having been repealed. The Public Health Act, 1936, gives the minister of Health power to make regulations (after consultation with the board of Trade or the ministry of Civil Aviation) to prevent danger to public health from vessels or aircraft arriving in the U.K. and to prevent infection being carried by vessels or aircraft leaving the country. There are many international conventions regarding these matters. There are also, in Great Britain, regulations under which dogs imported from abroad are kept in quarantine for a definite period.

Quaritch. Name of a British family of booksellers. Bernard Quaritch, the founder, was born

at Worbis, in Saxony, of Slavonic origin, April 23, 1819. He settled in London in 1842 and was naturalised in 1847. Quaritch started as a second-hand bookseller at Castle Street, Leicester Square, removing in 1860 to Piccadilly, where he made his business one of the chief book buying centres of the world. He was a book collector of fine discrimination who paid record prices for rarities. The early editions of FitzGerald's Omar Khayyám were published by him. He died at Hampstead, Dec. 17, 1899.

His son, Bernard Alfred, was born Jan. 13, 1871, and educated at Charterhouse, joining the family business in 1889. In 1907 he moved to Grafton Street, and died Aug. 27, 1913.

Quarles, FRANCIS (1592-1644). English poet. Born at Romford, Essex, May 8, 1592, he was educated at Christ's College, Cambridge. Appointed in 1613 cup-bearer to Elizabeth of Bohemia, daughter of James I, he accompanied her to Germany. Secretary to Archbishop Ussher in 1629, he was chronologer to the city of London from 1639 until his death, Sept. 8, 1644. He was buried in the church of St. Olave, Silver Street. A Royalist, who wrote several pamphlets denouncing parliament, Quarles is best remembered by his Emblems (moral and religious verse), 1635, and especially by his prose *Enchiridion*, 1641, a collection of essays and aphorisms. While one of the metaphysical poets, full of strained conceits, and something of a Puritan, he possessed a lively fancy and much felicity of expression.

Quarnero, GULF OF. Arm of the Adriatic Sea. E. of the peninsula of Istria, Italy, it stretches to the shore of Croatia, Yugoslavia, and contains the islands of Krk, Rab, Cherso, and Lussin. Fiume is the only good harbour on the entire coast.

Quarrying. Removal of portions of rock from open pits or caverns cut in the earth for that purpose. The word quarry, and its French equivalent *carrière*, are connected with the Lat. *quadratus*, squared, denoting a quarry as a place from which squared stones are cut.

Methods of quarrying depend mainly on the position of the rock, its hardness, its structure, and the purpose for which it is required. A hill slope is the best site for a quarry, for its floor is not then sunk below the general surface of the ground, and there is no diffi-

culty in raising the cut stone. Since the stone, when required for building, must be cut out in blocks, use is made of natural planes of weakness, such as bedding planes, joints, or cleavage; but where no such natural joints exist, the rock has to be cut. To do this, lines of holes are made with picks, and wedges driven into them until the rock splits. Another method is to drill holes elongated in the direction of the proposed cut, and to charge them with explosives. Blasting, however, must be conducted with great care when building stones are concerned, lest it shatter the rock. High explosives are used for blasting hard rocks when large quantities of material are required, and the size of the blocks is unimportant, as when road stone is quarried.

The plan on which the quarry is opened is important, and in many large quarries the stone is cut out so that the face of the quarry, *i.e.* the cut surface of the rock, is stepped or terraced. This method allows the quarrying to proceed simultaneously at several levels, and prevents dangerous falls of overhanging rock. In order that several gangs of men may work at once, the so-called stepped long-walled method is often adopted, the face of each terrace being cut in several vertical planes, each a little farther back than the last, so that each successive vertical layer has one free end, and a gang of men can be employed on each "wall." The blocks of stone are generally lifted out of the quarry with cranes, and carried to a convenient rly. or harbour by trucks run on rails, though sometimes the material is carted away, or is let down a hill slope with rope gear.

Slate, a sedimentary clayey stone, is obtained from open quarries or mines according to the position of the deposit and the nature of the overburden. The treatment of the rock is distinct only in that the cleavage planes do not necessarily coincide with the natural bedding planes or planes or layers on which the deposit was formed. The cleavage planes arose with heat and lateral pressure. Blocks are split along these layers to obtain the thin slabs of roofing material which is the commonest use of slate. *See* Building; Marble; Mason; Stone.

Quart. British measure of liquid capacity, the fourth part of a gallon. It contains 69·3185 cub. ins., or 2½ lb. of distilled water. The old English quart for wine

contained 57·75 cub. ins. and for beer 70·5 cub. ins. In the U.S.A. the quart contains 67·2 cub. ins. The reputed quart was a bottle, used for the sale of ale and nominally containing one fourth of a gallon, but, in fact, containing only one-sixth or less. Since the introduction of regulations enforcing the use of true weights and measures, the reputed quart bottle may be used only if it bears a label stating its true capacity.

Quartan Fever. Form of malaria in which two days intervene between consecutive attacks. The attacks, therefore, follow each other on the fourth day from the beginning of the previous attack. *See* Malaria.

Quarter. As a measure of weight or capacity, the fourth part of a larger measure, *e.g.* 28 lb. is the quarter of a hundredweight. It is generally used for corn measure, when it equals eight bushels. The four principal points of the compass are known as the four quarters. In the plural the term is used for the place where soldiers are accommodated (hence quarter-master).

From this probably comes the phrase to give quarter, *i.e.* to show mercy, implying that the vanquished man will be sent to the soldiers' quarters instead of being killed. Formerly a garrison which refused to surrender could be refused quarter; but under the Hague Regulations, belligerents may not declare that no quarter will be given. Persons who continue to fire after surrendering may be refused quarter. At sea a vessel which hauls down her flag is entitled to quarter.

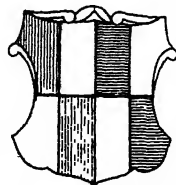
Nautically, the quarter is that part of the ship's side situated between the mainmast and the stern. *See* Moon

Quarter Days. In England, the days which mark the four quarters of the year for such matters as paying rent, etc. They are Lady day, March 25; midsummer day, June 24; Michaelmas, Sept. 29; and Christmas, Dec. 25. Half-quarter days are Candlemas, Feb. 2; May 9; Aug. 11; and Martinmas, Nov. 11.

Quarterdeck. After-deck of a warship. It is set apart for the officers, whose cabins are generally on the decks below it, and hence arises the use of the term quarterdeck as a synonym for the commissioned officers of the navy. In pre-Reformation days a crucifix stood on the quarterdeck, and to this everyone used to do reverence when going to that part of the

ship. From this arose the custom of saluting the quarterdeck, which still survives in the British navy.

Quartering. In heraldry, a method of marshalling (*q.v.*) whereby two or more coats-of-



Quartering in heraldry

arms are shown on one shield. In the simplest form when two coats are concerned, the principal one, usually the paternal arms, is placed in the first and fourth quarters, and the other in the second and third. If there are three coats, the principal one again occupies the first and fourth quarters, and the others respectively the second and third. There may be four coats, five, or even many more, but how ever many the divisions, it is still called a "quartered shield." Usually divisions are of an even number, the principal coat being repeated in the last quarter if necessary. But quartering by uneven numbers is often met with. Moreover, one of the coats to be introduced may already be quartered, which is then known as "grand quarter." Impaled quarters are also seen.

Quartering is the term applied in woodwork to strips of wood of any length, but square in section, *e.g.* 2-in. quartering, etc.

Quarterly Review. THE. British monthly periodical, devoted chiefly to politics, history, literature, and art. It was projected by John Murray and Sir Walter Scott in opposition to The Edinburgh Review, which had become a purely Whig organ. The first number appeared in Feb., 1809. William Gifford (*q.v.*) was editor, 1809-24, and among early contributors were Scott, Southey, Canning, Croker, and Heber. Salisbury and Gladstone later wrote for the review at the same time (not on politics). Mingling party politics with literary criticism, The Quarterly has always been a staunch supporter of the Tory or Conservative cause. After the brief editorship of Sir J. T. Coleridge, J. G. Lockhart (*q.v.*) conducted The Quarterly, 1825-53; Sir William Smith, 1867-93; R. E. Prothero (Lord Ernle) and G. W. Prothero, 1899-1922; then Sir John Murray until 1928, and from then his son, also Sir John.

Quartermaine, LEON (b. 1876). British actor. Born at Richmond, Surrey, Sept. 24, 1876, he was edu-

cated at Whitgift grammar school, and first appeared on the stage at Sheffield, 1894. After touring with Ben Greet's company, and with Martin Harvey in *The Only Way*, he came to London (Comedy Theatre) in 1900, and played in New York three years later. His greatest successes were perhaps soon after the First Great War in *Mary Rose*, *The Circle*, *Secrets*, and as *Ishak* in *Hassan*; then came *The Man with a Load of Mischief*, 1924. He gave memorable performances as *Malvolio* in *Twelfth Night*, 1933; *Charles Randolph* in *Dear Octopus*, 1938; *Coade* in *Dear Brutus*, 1941; *Scandal* in *Love for Love*, 1943.

Quartermaster. Regimental officer generally with the rank of lieutenant, though he may be of higher rank. He assists the commanding officer to provision and clothe the unit. He receives, issues, and accounts for rations, stores, and ammunition. The post carries a special rate of pay, and is permanent. Being a commissioned officer, the quartermaster is a member of the officers' mess. He is assisted by N.C.O.s called quartermaster-serjeants (Q.M.S.).

The word quartermaster also occurs in ranks of higher grade, e.g. quartermaster-general (Q.M.G.), a general officer in charge of the supply departments of the army, having under him assistant quartermasters-general (A.Q.M.G.).

In the merchant service, a quartermaster is a petty officer qualified to take the wheel and keep a ship on her course under the supervision of a navigating officer.

Quartern. Old English term for a measure of capacity, like the fourth part of a pint, the fourth of a peck or stone. The reputed 4-lb. loaf of bread is generally known as a quartern loaf.

Quarter Sessions. English court of law, so called because it usually meets four times a year. In the counties it consists of the justices of the peace, and they appoint two of their number as chairman and vice-chairman respectively. Certain cities and boroughs have also a court of quarter sessions, presided over by the recorder.

These courts hear appeals from the ordinary magistrates' courts and also appeals about rating and licensing matters, but have little other civil jurisdiction. As courts of first instance they try indictable offences of many kinds, but not treason, libel, or homicide. From their decision a convicted person can appeal to the court of criminal appeal, except when quarter ses-

sions sits solely as a court of appeal from a summary jurisdiction.

Quarter sessions arose in England in the 14th century owing to the fact that the magistrates were ordered to meet four times a year to discharge the business of the county. For this purpose the magistrates meeting in quarter sessions were the sole authority until the establishment of the county councils in 1888.

Quarter-staff. Weapon formerly much used by the English. It was a staff about 1½ ins. in dia-



Quarter-staff, as used in medieval England. From a print illustrating the fight between Robin Hood and the Tanner

meter, from 6 ft. to 8 ft. in length, and tipped with iron at each end. It was grasped in the middle by one hand and by the other a quarter way along, now at one end and now at the other, as policy dictated, the shifting of the hand giving it a circular play. Contests with the quarter-staff once formed a regular feature of rustic gatherings in England.

Quartet. Musical composition written for four solo voices or instruments. The former may be for male or female voices alone, or for any combination of the two, the most usual being for soprano, alto, tenor, and bass; the latter, in most instances, is for strings alone, consisting of 1st and 2nd violins, viola, and violoncello. This combination has attracted most of the great composers. There are examples of the combination of wind and string instruments. Occasionally the pianoforte is used and the 2nd violin omitted; this is known as a piano quartet, the finest examples being by Brahms. The term is also used of the performers collectively.

Quartier Latin (Fr., Latin quarter). District of Paris, south of the Seine. It contains the Sorbonne and was early a resort of scholars, its name being due to the fact that Latin was their usual speech. Later it became noted as the resort of students of art.

Quarto (from Lat. *quartus*, fourth). Term used of paper when a sheet is folded twice, making four leaves or eight pages, abbreviated as 4to; it is applied to books a size smaller than folio, or usually 9½ ins. by 12 ins. A quarto is also an Italian dry measure equalling a little over two bushels, and in Portugal a liquid measure holding nearly 3½ litres. See *Folio*.

Quartz. Natural crystalline form of silicon dioxide, SiO₂. It occurs as grains, massive or in hexagonal prisms with pyramidal terminations. Quartz is hard, translucent or transparent, and the crystals vary in colour from clear colourless (rock crystal) to smoky brown (Cairngorm) and black; the clear purple variety is known as amethyst and the yellow as false topaz or citrine. Cryptocrystalline varieties include chalcedony, carnelian, prase, agate, onyx, sardonyx, flint, jasper, etc. Quartz is widely distributed as irregular grains in rocks, forming the essential constituent in sandstone, quartzites, and arenaceous rocks in general; it also occurs in granite and other igneous and metamorphic rocks. The massive and crystal forms are found in veins and fissures often contributing to the gangue of metalliferous deposits.

Quartz is used in mortar and cement; as a flux in metallurgy; in the manufacture of glass and silica brick; in abrasives; as a filler; and for other purposes. Quartzite and sandstone are widely employed as building stone. The crystalline varieties are used in jewelry, whilst the best rock crystal is fused to make special optical lenses and prisms, drawn into threads for use in highly sensitive instruments. The most important use of crystalline quartz is based on its piezoelectric properties: when an orientated section of a selected crystal is subjected to pressure it becomes electrified, and conversely an applied charge causes distortion of the slab. Piezoelectric sections detect extremely delicate changes of pressure in depth-sounding apparatus, and measure high pressures resulting from artillery or bomb explosions. The principle is also applied in radio. The chief producer of piezoelectric quartz is Brazil.

Quartzite. In geology, the name given to a metamorphic rock composed chiefly of quartz. It is the result of alteration of sandstone by the accretion of

silica round the original sand grains and the solidification of the whole sandstone into a dense vitreous rock.

Quash. Legal term. In English criminal law, if an appeal against conviction succeeds, the latter is quashed, *i.e.* annulled. An indictment may also be quashed because of some defect in it. If the whole body of a jury is successfully challenged (challenge to the array), the array is quashed.

Quasimodo. Name of the hunchback foundling bellringer in Victor Hugo's novel *Notre Dame de Paris*. He was found on Low Sunday, the first Sunday after Easter, which is called Quasi Modo from a hymn sung on that day. (*Quasi modo geniti infantes*, *As new-born babes*).

Quasi-Optical Waves OR QUASI-VISUAL WAVES. Name often given to electro-magnetic waves (also known as metric waves) of lengths below 10 metres (corresponding to frequencies above 30 megacycles per second), on account of certain resemblances between their behaviour and that of the much shorter electro-magnetic waves associated with visible light. Light waves normally follow straight line courses, and to the inhabitants of the earth the horizon marks the limits of the range at which objects on its surface can be seen.

Quasi-optical waves are now largely used for short-range radio transmission, including frequency-modulated broadcasting, for television, and for radar. Most textbooks published before 1939 state or imply that the range of transmission on these wavelengths is little beyond the horizon visible to the eye from the transmitting aerial. Instances reported of reception at vastly greater ranges were put down to freak conditions. During the Second Great War enormous use was made of quasi-optical waves, for radar. The scientific study of their behaviour has since been intensified.

It used to be held that their only possible path was ordinarily the direct, or straight line, from transmitting to receiving aerial, and that, unlike other radio waves, they were not reflected back to earth by any layer in the atmosphere. It is now known that besides the direct or visual path these waves may follow one or more of three paths because of reflection of one kind or another.

One of these reflectors is the "atmospheric duct," a common occurrence in settled weather.

Under such conditions the temperature may not show its expected decrease with height—it may even increase; there may also be an abnormally rapid decrease with height in the water-vapour content of the air. Thus is formed a kind of conduit for the waves. Its upper wall may be only a few yards above the surface of the ground, and the waves are thus bent to follow the contours of the earth for distances up to 150 miles.

Secondly, at times near a sunspot maximum the F-layer, through which such waves ordinarily pass, may become so strongly ionised that it reflects them back to earth at great distances. Such conditions were observed in the autumn of 1947, when police radio and other transmissions from the U.S.A. caused severe daily interference with the London television. F-layer reflections of metric waves have been recorded at ranges up to 5,000 miles.

The third cause of long-range travel by quasi-optical waves is known as "sporadic-E." In summer strong sunlight may cause a super-ionisation of odd patches of the E or Heaviside layer, and metric waves, which normally penetrate that layer, may be reflected back to earth at ranges up to 1,000 m. and more.

Quassia (*Quassia amara*). Tree of the family Simarubaceae, native of tropical America. Alternate



Quassia. Leaves and tubular flowers of the Surinam variety

leaves are broken up into a double row of leaflets, not unlike those of the ash. The large, tubular, scarlet flowers are clustered. The wood is intensely bitter, and was formerly used as a tonic and in dysentery, but the quassia of modern medicine is furnished by an allied tree (*Picraena excelsa*), a native of Jamaica, whose timber is exported in the shape of logs.

Quatermain, ALLAN. Adventurous and mystic character in

four novels by Rider Haggard (*q.v.*). A combination of scholar and "leatherstocking," he is the central figure in King Solomon's Mines (1885); Allan Quatermain (1887); Allan's Wife (1890); She and Allan (1921).

Quaternary. In geology, name given to the latest of the main time-periods, *i.e.* the one following the Tertiary. It includes the present day. It is estimated as having begun about 1,000,000 years ago, and is subdivided into two systems, (1) Pleistocene, and (2) Recent, or Holocene. The earlier Pleistocene was remarkable for the widespread development of glaciers and ice-sheets, and is often referred to as the Ice Age or Glacial Period. The ice spread from centres of snow accumulation and covered much of the N. hemisphere in Europe and America. The Antarctic ice-sheet was also thicker and more widespread than now. In mountainous districts in lower latitudes (*e.g.* Alps, Himalayas) glaciers descended further and even flowed out on to the surrounding plains. In the Alps four cold glacial and warm inter-glacial stages have been recognized, but in Great Britain only two are known.

Pleistocene deposits include boulder clay and material washed out in front of the glaciers by melt water. Coombe rock, raised beaches, river terraces, gravels, and alluvium were also formed and deposited at this time. The extensive peat deposits of Scotland, N. England, etc., were formed after the glaciers retreated. When the ice melted its weight was removed from parts of the continents, which have in consequence been steadily rising ever since. In Scandinavia this uplift has amounted to 850 ft. above present sea-level.

Evidence of the existence of man and his early ancestors is first found in the early Quaternary deposits. This consists of artefacts or stone implements, which are also associated with fossils of many animals, some now extinct. Remains of mammoth, rhinoceros, Irish elk, musk ox, etc., have been found in the Thames gravels. Elsewhere in deposits found in caves, particularly Kent's Cavern near Torquay, occur hyaena and sabre-toothed tiger. *See* Fossil; Geology; Ice Age. *Consult* The Quaternary Ice Age, W. B. Wright, 1936.

Quaternions. Branch of mathematics invented by Sir W. R. Hamilton. It is an analytic method

which places a new interpretation on imaginary algebraic quantities, generalising directions in space. Such directions are commonly referred to the coordinate axes of Descartes, and expressed in terms of Cartesian coordinates. From the point of view of geometry the method of quaternions is an extension of Cartesian geometry, which gets rid of coordinate axes and treats all directions in space on the same terms, and a quaternion may be regarded as a factor or operator of two directed lines in space which changes one of these directed lines into another. The symmetry of an analytic method applicable to a space of three dimensions made Hamiltonian quaternions of the utmost value in solving problems in physics, such as are connected with heat conduction, electric potential, etc. To change the length and direction of a line involves four distinct numbers, and for this reason Hamilton called the operator bringing about the change a quaternion.

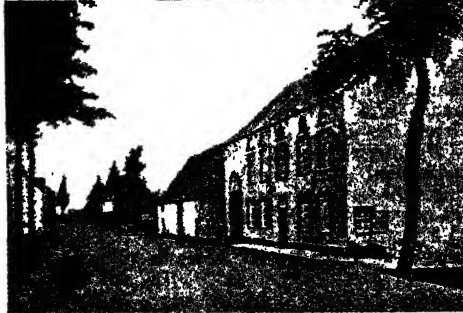
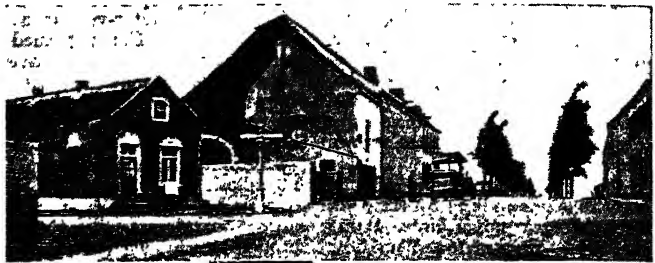
Quatorzain (Fr. *quatorze*, fourteen). In English literature, a poem of 14 rhymed iambic pentameter lines. It is often confused with the sonnet (*q.v.*), by the rigid laws of which form it is not bound. The quatorzain is divided into three quatrains of alternate rhymes, which may, but need not, be the same in the successive quatrains, and a final rhymed couplet, which the strict sonnet never has. Most of the Elizabethan "sonnets" are really quatorzains, and in spite of the efforts of the purists the mistake has been perpetuated.

Quatrain (Fr. *quatre*, four). Complete expression of a single thought in four rhymed lines of whatever measure and arrangement. The quatrain is especially apt to the epigram. The lines written by the earl of Rochester (1647-80) on King Charles II's bedchamber door are an example:

Here lies our sovereign lord the King,
Whose word no man relies on;
He never says a foolish thing,
Nor ever does a wise one.

Quatre Bras. Village of Belgium, in the prov. of Brabant. Its name comes from its position at the meeting of the Brussels-Charleroi and Namur-Nivelles main roads, $2\frac{1}{2}$ m. S. of Genappe. It is famous as the scene of the battle of June 16, 1815, preceding the battle

of Waterloo. In pursuance of his intention of destroying the British and Prussian armies separately, Napoleon ordered Ney to attack



Quatre Bras, Belgium. House where the duke of Brunswick, who commanded the Hanoverian troops, died of his wounds. Top, right, the village, at the cross-roads

the former at Quatre Bras while he engaged Blücher at Ligny. The marshal was slow in carrying out the order, and it was afternoon before he attacked the Dutch and Belgians under the prince of Orange. Wellington, in Brussels, hurried up some British troops, and their arrival prevented the French from scoring a success, but the fight, in which the British and their allies lost 4,500 men, was a very sanguinary and stubborn one. Towards evening, Wellington ordered a general advance which swept the French from their positions, but he was unable to reap the full fruits of his victory on account of the necessity of connecting with Blücher, who was retreating from Ligny. See Blücher; Napoleonic Campaigns; Ney; Waterloo; Wellington.

Quatrefages de Bréau, JEAN LOUIS ARMAND DE (1810-92). French anthropologist and zoologist. Born near Valleraugue, Gard, Feb. 10, 1810, he studied medicine at Strasbourg, practised and taught at Toulouse, 1838, removed to Paris, 1840, and became professor of anatomy and ethnology at the Natural History Museum, 1855. He was hon. F.R.S., 1879. His works include *The Polynesians and Their Migrations*, 1866; and an *Atlas of Human Crania*, 1875-82. There are Eng. trans. of *Metamorphoses of Man and the Lower Ani-*

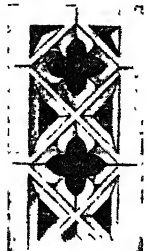
mals, 1864; *The Prussian Race*, 1872; *The Human Species*, 1879; *The Pygmies*, 1895. He died in Paris, Jan. 12, 1892.

Quatrefoil (Fr. *quatre*, four; *feuille*, leaf). In architecture, an opening in tracery consisting of four lobes tangent to the inner side of a circle and meeting each other at cusps within the circle. Square panels inscribed with a quatrefoil are a common ornament in Gothic architecture. See Cinquefoil; Cusp.

Quatremère, ETIENNE MARC (1782-1857).






Quatrefoil, architectural examples



French Orientalist. After studying at the Collège de France, he became professor of Greek at Rouen, 1809, and of Hebrew at the Collège de France ten years later. In 1838 he was appointed professor of Persian. He was the first to prove the derivation of Coptic from ancient Egyptian, and his many philological and historical works are valuable.

Quatremère de Quincy, ANTOINE CHRYSOSTOME (1755-1849). French archaeologist. A staunch upholder of the Revolution, he occupied several responsible posts under the republic and empire. As intendant of arts and public monuments, 1815, he did much to preserve the archaeological remains of France, and wrote numerous works on architecture and art.

Quaver. Musical note represented thus: , its value being one-eighth of a semibreve. Two or more quavers may be grouped thus: . Its corresponding rest is . So far as can be learned, the quaver was invented during the

15th century, being known at first as Chroma, Fusa, or Unca, and later as the Lesser Semiminim. In America and Germany it is called an eighth note, in France a crook or hook (croche).

Quay. Embarkation and landing place, formed alongside a river or sea, or in a dock or harbour, against which ships may berth. There is no clear distinction between a quay and a wharf, but the former term is generally applied where a long stretch of river or sea shore is embanked by a masonry wall for the purpose above defined, or where a dock wall or masonry mole or breakwater provides shipping accommodation and facilities. A short coaling wharf on a river bank supported by piles would not be called a quay. Quays are usually equipped with appliances for the loading and unloading of ships, and carry railway and road traffic. Their length or area is known as quayage. *See Dock; Harbour; London, Port of. Prom. kee.*

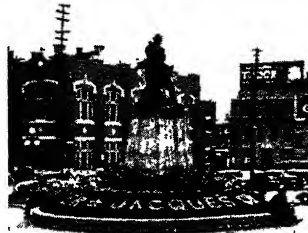
Queanbeyan. Town of New South Wales, Australia, in Murray co. It is 55 m. by rly. S.S.W. of Goulburn, on the Queanbeyan river. It is the rly. junction for Canberra. Pop. 4,019.

Quebec. Largest of the nine provinces of Canada. Its area is 594,860 sq. m., of which 523,860 sq. m. are land. The population (1948 est.) is 3,792,000. More than three-quarters are of French descent. Quebec is the capital, but Montreal is much the largest city. In 1927 the Labrador peninsula was transferred to Newfoundland.

Broadly speaking, Quebec consists of two parts. The smaller and more settled is the original Canada, a narrow belt on either side of the St. Lawrence from below Quebec to just above Montreal. The larger is an area which includes part of the peninsula lying between Hudson Bay and the Atlantic, from which it is separated by Labrador. The N. part, the former territory of Ungava, was added in 1912.

The prov. is flat, little more than one immense plateau with nothing higher than 2,000 ft., although on the S. of the river there are hills rising to nearly 4,000 ft. Its rivers, excluding the St. Lawrence, are not long. From a watershed almost in the centre of the prov. they flow in all directions; S. into the St.

Lawrence, W. into Hudson Bay, N. into Ungava Bay, and E. through Labrador into the Atlantic. Others come from the U.S.A. to fall into the St. Lawrence. Lakes abound, Mistassini and St. John being the



Quebec, Canada. Memorial in the city to Jacques Cartier

largest. The largest island is Anticosti at the mouth of the St. Lawrence.

Quebec produces wheat, barley, oats, and cereals, but is more famous for its horses, cattle, and sheep. Dairying is largely practised, cheese and butter being the principal products, and there is tobacco growing on a considerable scale. Mineral production increased from \$25,000,000 in 1926 to \$104,000,000 in 1942. From the prov. the world obtains some 70 p.c. of its asbestos. Much land is covered with forests, and lumbering is an important industry, as is the production of pulpwood. For the industries water power is abundant. The St. Lawrence is the great highway, except in winter. The more populous parts are well served with rlys., both steam and electric. Montreal and Quebec are on the three transcontinental lines, and also in direct connexion with the various U.S.A. railroad systems.

In the Dominion parliament Quebec is represented by 65 members. Its local affairs are under a lieut.-gov., a premier and cabinet, and the legislature, with a council of 24 nominated and an assembly of 81 elected members. By the Quebec Act the R.C. Church obtained freedom of worship. Separate systems of public education for the Protestants and for the Roman Catholics are carried on. There are two Protestant universities, McGill (Montreal) and

Bishop's (Lennoxville), and two R.C. ones, Laval (Quebec city) and Montreal. It is the only province where liquor may be served with meals.

The early history of Quebec is really that of Canada. In 1535 it was taken in the name of the king of France by Jacques Cartier, and during the next two centuries was French. In 1763 it passed by conquest to Britain, and in 1791 was made a separate province. The rebellion in Quebec, 1837-38, led to the union of Upper and Lower Canada in 1841, a union which broadened into the federation of 1867. *See Canada.*

Quebec. City of Canada and capital of the prov. of that name. It stands on the N. bank of the St. Lawrence just where it is joined by the St. Charles, being built in the angle formed by the two. It is 180 m. from Montreal. The position is a magnificent one, being on the top of bold cliffs with the river, which is here over a mile wide, at their base. The headland is known as Cape Diamond. It is served by the C.P.R. and the Canadian National lines.

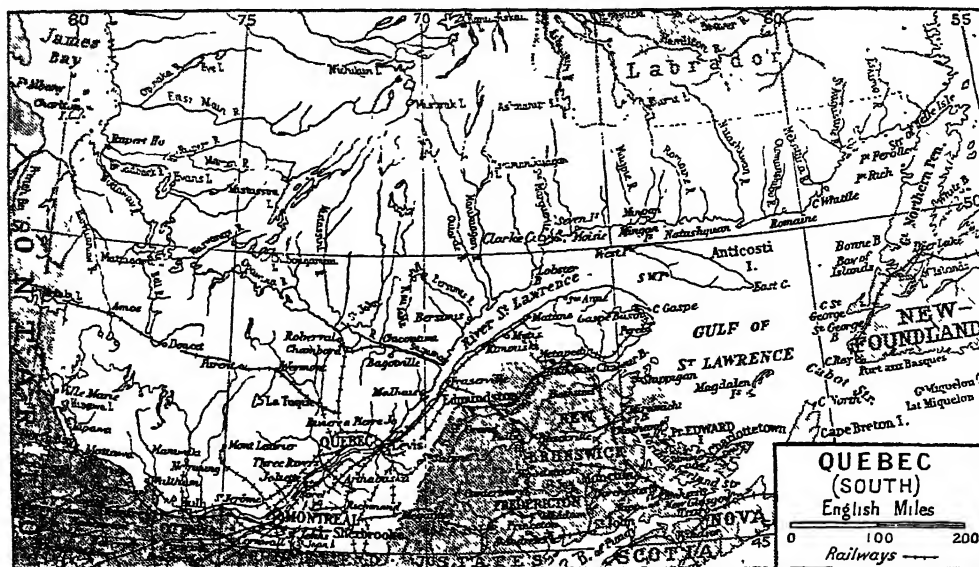
Quebec consists of an old and a new town, or lower and upper, steps leading from one to the other. The lower town is the older one, and the business centre. The old city crowns the summit of the cliff, but includes a few narrow picturesque streets at its base; the large modern manufacturing district is on the flat banks of the St. Charles. Walls, built in the 19th century, stand on the site of the original fortifications, and the citadel with its glacis and massive walls dominates the city. Outside



Quebec arms



Quebec. Plan of the city showing principal docks and wharves



Quebec. Map of the Canadian province formerly known as Lower Canada

the walls, overlooking the St. Lawrence, are the Plains of Abraham.

The most important churches are the R.C. cathedral, built in the 17th century and enlarged later; Notre Dame des Victoires, built to celebrate the repulse of the English fleet in 1690 and 1711; the Anglican cathedral, and S. Matthew's. Laval university is a large building, including a library and a picture gallery. The city's finest promenade is Dufferin Terrace overlooking the St. Lawrence; here, where the Château St. Louis, the headquarters of the French government, stood until burnt down in 1834, is a statue of Cham-

plain. The Hôtel Dieu, founded in 1639, is a hospital, and there are other remains of the French occupation, including the Ursuline convent. The buildings of the Quebec legislature form a fine block standing in large grounds.

Quebec's chief industry was shipping, but much of its trade has passed to Montreal. It has, however, a fine harbour, protected by the Isle of Orleans, and extensive docks. Timber is a staple industry, and here are sawmills and furniture factories. The manufactures include machinery, boots and shoes, leather goods, etc.

Quebec was founded in 1608 by

Champlain, its name, an Indian one, referring to the narrowing of the river here. Earlier it was an Indian settlement. From 1629 to 1632 it was in possession of the English, and in 1663 was made the capital of New France, being for long the largest city of Canada, the military headquarters, the centre of social life, and the ecclesiastical metropolis. In 1759 it was taken by the British, and in 1763 was ceded to Great Britain, and remained the capital of Canada until 1841. There was a great celebration in honour of its tercentenary in 1908. Pop. est. 165,000. See Abraham, Plains of; Bridge illus., p. 1424; consult Old Architecture of Q., R. Traquair, 1947.

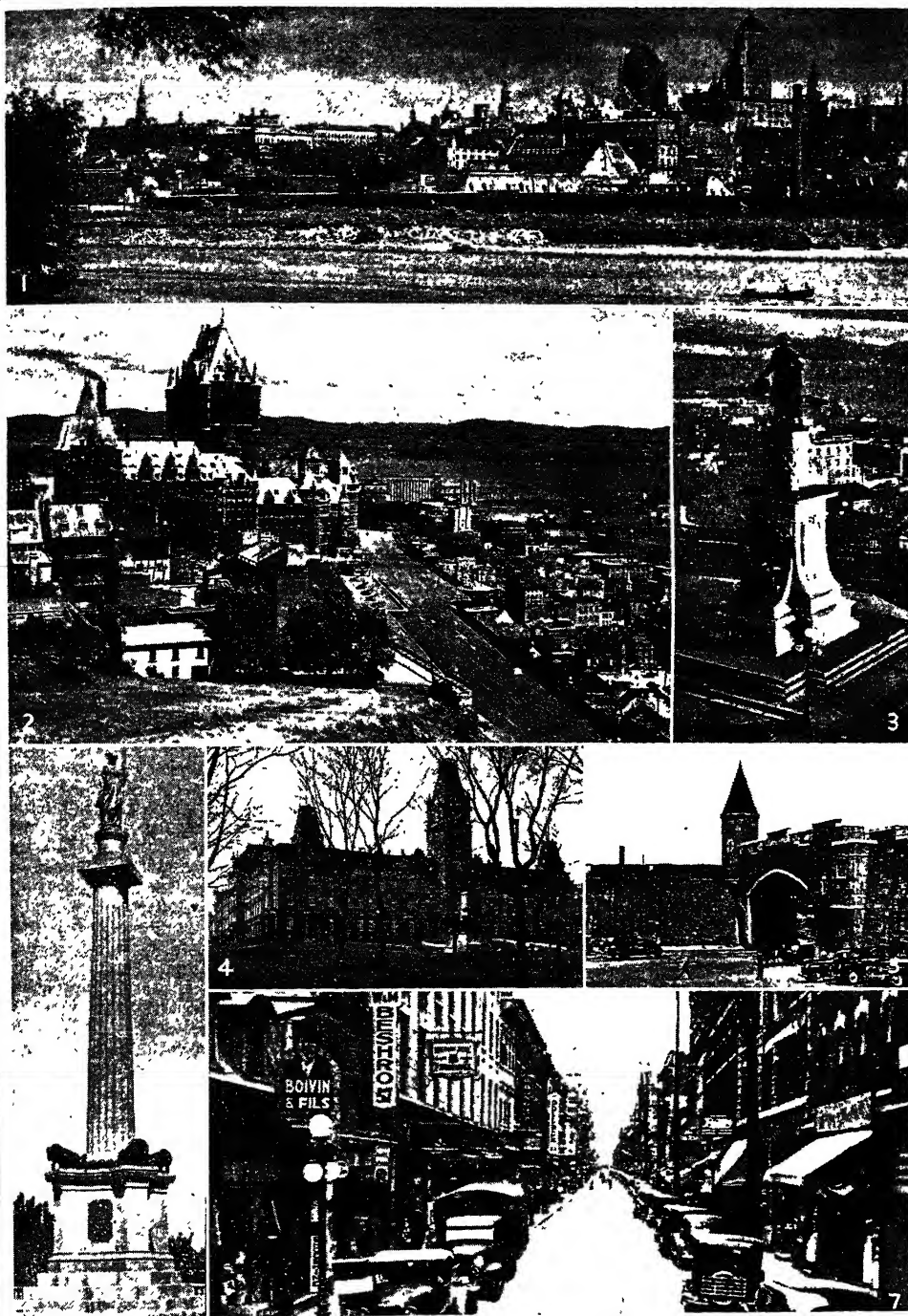
Quebec, CAPTURE OF. British success during the Seven Years' War. In 1711 the British in N. America equipped a force of 5,000 men to drive the French from Quebec, but the fleet which carried them was damaged by a storm.

In 1759, under Wolfe, 9,000 men were sent with a fleet up the St. Lawrence. On June 26 they cast anchor off the Isle of Orleans, and the French defenders offered little opposition to the establishment of their camp along the Montmorenci. For some months, however, Wolfe did nothing effective.

On Sept. 3 the troops were first moved to the other (S.) side of the St. Lawrence. On the 12th an attack was feigned below the city, while secretly Wolfe with 4,000 men went up the river in boats. In the night they were taken quietly



Quebec. The capture of Quebec by General Wolfe, Sept. 13, 1759, as depicted in an old print



1. View from the St. Charles river. The main buildings outlined against the horizon are, from L. to R., the Seminary, the Basilica steeple, the tower of the Château Frontenac, and the Price building. 2. View from the citadel showing the Château Frontenac, Dufferin Terrace, a section of the harbour, and the

St. Lawrence river. 3. Statue of Samuel de Champlain, founder of the city. 4. Parliament House. 5. St. John's gate, part of the stone fortifications encircling the old part of the city. 6. Des Braves memorial, Plains of Abraham. 7. St. Joseph Street, one of the older, narrower thoroughfares

QUEBEC, CANADA: VIEWS OF THE HISTORIC CITY, CAPITAL OF THE PROVINCE OF QUEBEC

By courtesy of the Canadian Government

to the spot, about 1½ m. above the city, selected for a landing, and in the early morning of the 13th they disembarked and ascended a narrow path to the heights above the river. The French were soon in battle order, and the engagement took place on the Plains of Abraham. The British fire soon broke the French line and the latter fled into the city, the British following until stopped by the guns of the garrison. Both leaders, Wolfe and Montcalm, were killed. The British remained in possession, and on Sept. 17 Quebec surrendered. See Abraham, Plains of; Wolfe.

Quebec Act. Measure passed into law in 1774, which dealt with the government of the province of Quebec, annexed by Great Britain eleven years before. The Act extended the area of the province, taking in a large tract of land N. of the St. Lawrence, previously part of Newfoundland. Roman Catholics were confirmed in the freedom of worship they had enjoyed under the rule of France, and their priests were allowed to collect tithes from the faithful. French law was to prevail in civil and English law in criminal cases. The government was entrusted to a nominated council, and the parliament in London retained the right of taxation.

Quebec Bridge. Bridge crossing the St. Lawrence river at Quebec. At the time of its erection it was the longest clear-span bridge in the world, its central span between supports exceeding the main spans of the Forth Bridge by 90 ft. The bridge is of the cantilever type, with a main river span of 1,800 ft. clear opening, which includes a girder span 640 ft. long supported on the ends of the cantilever arms, of which there are four. The total length is 3,240 ft., and the clear height from water-level to the underside of the central span is 150 ft. It carries two rly. tracks and a foot-walk. It was opened to traffic in 1917.

The erection of the first bridge proceeded until one of the cantilever arms and a portion of the central girder span were completed, when, on Aug. 29, 1907, nearly half the bridge, weighing some 15,000 tons, collapsed into the river, with a loss of about eighty lives. In 1910 a contract for a new bridge of improved design was made, and work proceeded until Sept., 1916, when, in the act of hoisting the central span into position, the latter, measuring 640 ft. long and weighing 5,500 tons, collapsed, leaving the

cantilever arms intact. See Bridge illus. p. 1424.

Quebec Conference. Name given to two conferences held at Quebec during the Second Great War. The first, Aug. 17-25, 1943, was attended by Winston Churchill, prime minister of the U.K., F. D. Roosevelt, U.S. president, and T. V. Soong, Chinese foreign minister. It decided, among other things, that there should be a diversionary landing in S. France to coincide with the main Allied landings in Normandy (the S. France landing was in fact made two months later); drew up strategic plans for the advance in the Pacific against Japan; and set up S.-E. Asia command, under Lord Louis Mountbatten as supreme Allied commander in S.E. Asia. At the second, Sept. 11-16, 1944, attended by Churchill, Roosevelt, and the combined chiefs of staff, plans were drawn up for Allied strategy in the Pacific and in Europe during the ensuing months; one important decision was to cut out three intended Pacific operations and go straight to Leyte in the Philippines. Stalin was invited to attend the 1944 conference, but excused himself on the ground that with the Russian offensive developing on an increasingly broad front, he could not leave the direction of the army. Churchill went to Moscow, Oct. 9-18, to inform him of the decisions reached.

Quebracho (*Aspidosperma quebracho*). Tree of the family Apocynaceae, native of S. America.



Quebracho. Leaves and flowers of this S. American tree. Inset, single flower

Its bark yields the drug known as white quebracho, which has been administered in cases of dyspepsia, phthisis, and bronchitis.

Quedlinburg. Old German town in the Land of Saxony-Anhalt. It stands on the river Bode, near the Harz mountains. Built in 936 by Otto the Great as a convent for the daughters of emperors, and

a sovereign principality, Quedlinburg developed into one of the principal seats of learning of medieval Germany. Its surviving buildings recall this period: a huge cathedral, 1070-1129 (crypt, 936, with royal tombs); a town hall of 1310; S. Nicholas, a 13th century church; S. Benedict, 13th-15th century. In 1485 the Saxon dynasty acquired the protectorate over the abbey, which in 1540 was converted to Protestantism and in 1698 sold to Brandenburg. Modern Quedlinburg gained a reputation for nurseries and seed production; it had also engineering works and dye factories. Little damaged in the Second Great War, it lay in the Russian zone of occupation after it, and received many refugees. Pop. (1950) 35,850.

Queen (A.S. *cwēn*). Term applied to a woman ruler. A queen regnant rules in her own right; a queen consort is the wife of a ruling king; a queen dowager is the widow of a deceased king. While some countries bar a female from succession to sovereignty, e.g. by the Salic Law (*q.v.*), others take a queen only in default of heirs male. In the British Empire a woman succeeds her father on the throne when she has no brothers, and thus Princess Elizabeth is heiress presumptive to King George VI. Besides being used for a piece in chess (*v.i.*) and a picture card in a pack of cards, the term queen is found by extension in the animal kingdom, e.g. queen bee, queen wasp, to denote a creature of special function. A female cat is also called a queen.

Queen. The most powerful piece on either side in a game of chess. It can move any number of squares in a straight line vertically, horizontally, or diagonally, so long as no piece of its own colour blocks the way, and may capture an enemy piece that does. Its present powers date from about 1480. See Chess illus. p. 1996.

Queen. One of the picture cards in each suit of a pack of playing cards. In all standard games it ranks immediately below the king, though in the true Spanish pack there are no queens. In the old French pack the queen of hearts was called Judith (probably after a daughter-in-law of Charlemagne); diamonds, Rachel; clubs, Argine (perhaps an anagram of Lat. *regina*, queen); spades Pallas, or Minerva. The queen of spades is commonly regarded as unlucky and in games of the Black Lady class is a penalty card; though in bézique it is specially valuable.

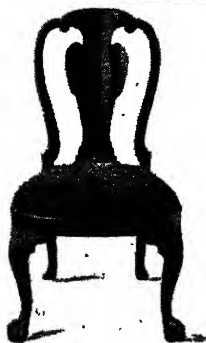
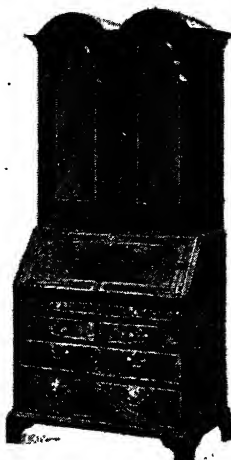
Queen, THE. London journal for women. Its full title is The Queen, the Lady's Newspaper, and Court Chronicle. Founded as a weekly by S. O. Beeton, Sept. 7, 1861, The Queen, an Illustrated Journal and Review, was acquired in 1862 by Mr. Serjeant Cox, who, in 1863, bought the Lady's Newspaper, which had existed since 1847, and amalgamated the two publications. Another amalgamation was with The Court Chronicle, while the Bazaar, Exchange, and Mart first appeared as a Queen supplement. The Queen was acquired in 1919 by the proprietors of Land and Water, and issued by The Field Press, Ltd. On Dec. 31, 1937, it passed into the ownership of Hector Caird. During the Second Great War it became a fortnightly.

Queen Alexandra's Royal Army Nursing Corps. British nursing organization, known until 1949 as Queen Alexandra's Imperial Military Nursing Service. This was founded in 1902, from the organization previously known as the Army Nursing Service. Appointments are given to unmarried women duly qualified under War office regulations. In 1918 the two advisory boards which hitherto dealt with the Q.A.I.M.N.S. and the Territorial Force Nursing Service were reconstituted as a joint board under the title of Queen Alexandra's Army Nursing Board, with the director-general, A.M.S., as chairman. There was a Queen Alexandra's Imperial Military Nursing Service Reserve in the First and Second Great Wars. See Nursing.

Queen Anne. Style of architecture existing in England during the reign of Anne (1702-14). In fact, this period witnessed no special developments in architecture, and the fashionable style throughout it was according to the classic ideals of Early Georgian. But in the indigenous architecture of England there lingered many traces of the picturesque Elizabethan manner, half classic and half medieval; and the architects of the later 19th century, who reintroduced the old chimneys, dormers, and gables into domestic dwellings, found it convenient to label their efforts as "Queen Anne." Attractive results were obtained by Norman Shaw (*q.v.*),

and others working along the same lines, in England. The attempt to introduce this fashion into the U.S.A., with different and inappropriate materials, was hardly a success. Of genuine Queen Anne buildings, Blenheim Palace, designed by Vanbrugh (*q.v.*), is one of the few examples of first-class importance. (See Architecture).

In furniture, the age of Queen Anne was marked by a tendency towards comfort and home-



Queen Anne. Three examples of Queen Anne style furniture. A card-table in oak veneered with walnut. Top, a walnut bureau cabinet. Bottom, a walnut chair

Centre photo by courtesy of the Director, Victoria and Albert Museum, London

liness, differing from the ornateness of previous periods, and altogether apart from the important movement in France. Dutch marquetry work, sometimes imitated by English furniture makers, was the only foreign element in this strongly English style. Walnut was the principal wood, but larger pieces such as the settee were in oak, as in Jacobean times. Characteristics of Queen Anne tables and chairs were the cabriole and colt's-foot legs.

Chairs, though sometimes made with solid backs, more often show the open type of back, with a fiddle or urn shaped splat. Claw-and-ball feet were common. The seat was generally loose and stuffed. Cabinets, chests of drawers, "grand-

father" clocks, were ornamented with marquetry. Veneering also came into practice during this period, and some graceful effects were obtained thereby. The cabinet or chest of drawers on a stand with horned legs, veneered in walnut, is typical of the period. The modern bureau, with bookcase above and sloping front covering drawers and recesses, dates from this time. Black and gold lac decoration was introduced from the East, through Hol-

land. Consult Veneered Walnut Furniture, 1660-1780, R. W. Symonds, 1947.

Queen Anne's Bounty. Fund originally derived from the first-fruits and tenths of certain clerical incomes, formerly part of the crown revenue and transferred in 1704 by Queen Anne to the Church of England. First-fruits and tenths were almost entirely abolished in 1926. It then dealt with collection and distribution of dilapidation charges, sale and purchase of parsonage houses and glebe. On March 31, 1948, it united with the Ecclesiastical Commissioners under the new title of Church Commissioners of England.

Queen Bee. Type of radio-controlled, pilotless aeroplane developed at the Royal Aircraft Establishment, Farnborough, in 1935, as an A.A. target. The first was a Tiger Moth with a radio receiver tuned in to a ground transmitter. Ground signals passed through the receiver to relays and operated the aircraft's rudder, elevators, and engine-throttle. Queen Bees were used during and after the Second Great War to train army and naval A.A. gunners.

Queenborough. Mun. borough and seaport of Kent, England. On the Isle of Sheppey, it stands at the junction of the Swale and the Medway, 2 m. by rly. S. of Sheerness. Formerly there was a daily service to Flushing. Glass, pottery, and fertilisers are manufactured. Queenborough is named after Philippa, wife of Edward III,



Queenborough arms

as that king built a castle here to protect the crossing of the Swale. It was made a borough about the same time, and from 1572 to 1832 sent two members to the house of commons. It was a centre of the wool industry and has oyster fisheries. Pop. 3,000.

Queen Charlotte Islands. Insular group off British Columbia, Canada. The islands lie 130 m. N.W. of Vancouver in the Pacific Ocean. Graham Island, the largest, is for the most part low and level, though Mount Needham, in the S., reaches 4,000 ft. The smaller islands are mountainous, reaching over 5,000 ft. Forests abound, and there are some minerals. They are sparsely populated, and Keddah Bay, Queen Charlotte City, and Skidegate are the chief settlements.

Queen Charlotte's Hospital. Maternity hospital, founded in 1739 in Marylebone, London. In 1940 it was removed to a 6-acre site at Goldhawk Road, Hammer-smith, the new buildings costing over £500,000 and taking several years to build. Building continued during and after the Second Great War. It is a famous training school for midwives, and in 1948 was combined, as a post-graduate teaching hospital, with the Chelsea Hospital for women, under the title of Queen Charlotte's and Chelsea Hospitals. It was then to work in conjunction with the new institute of obstetrics and gynaecology.

Queen Charlotte Sound. Channel of the Pacific coast of Canada. It separates the N.E. of Vancouver Island from the mainland of British Columbia, and is connected with the Strait of Georgia to the S. by narrow channels which do not exceed half a mile in width at Seymour Narrows.

Queen Elizabeth. Former British battleship and nameship

powered by geared turbines developing 80,000 s.h.p. to give her a maximum speed of 24 knots. Her armament contained battery of eight 15-in. guns; she was the first British battleship to mount guns of this calibre and the first to be entirely oil-fired. She carried a complement of 1,100 men.

In the First Great War she was Admiral de Robeck's flagship at the Dardanelles, and in 1917 flagship of the Grand Fleet. She was not in the battle of Jutland as she was in dry dock, but it was on board her that Beatty arranged and received the surrender of the German fleet in 1918. The Queen Elizabeth served in the Mediterranean in the early part of the Second Great War. While at anchor in Alexandria, Dec., 1941, she was sunk by Italian "frogmen" who attached limpet mines to her hull. Raised and patched, she was repaired in New York, becoming flagship of Admiral Cunningham's Mediterranean fleet. In 1945 she was flagship of the East Indies fleet and served off Burma. She was scrapped in 1948.

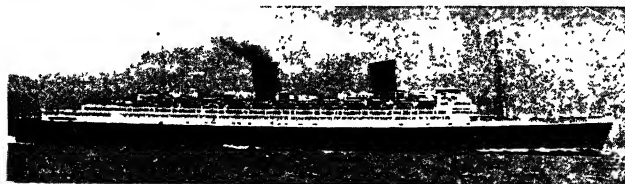
Queen Elizabeth. British liner. Laid down at Clydebank on Dec. 4, 1936, for the Cunard-White Star Line, she was launched by Queen Elizabeth on Sept. 27, 1938. Displacing 85,000 tons on a length of 1,031 ft. and a beam of 118 ft., she is powered by geared steam turbines developing 158,000 h.p. and driving four propellers to give a service speed of 29 knots. She can accommodate 850 first-class, 720 cabin-class, and 745 tourist-class passengers, arranged on 14 decks, and carries a crew of 1,100. In the fitting-out basin at Clydebank when the Second Great War started, she was hurriedly made seaworthy, and on Feb. 26, 1940, sailed for New York, where

service with the Queen Mary (*q.v.*), bringing U.S. troops to Great Britain and accommodating 15,000 men on each passage. She never sailed in convoy, but relied for protection on her high speed and armament of 32 guns. After VE-day, the Queen Elizabeth repatriated U.S. and Canadian troops until March, 1946. She sailed from Southampton for New York on her first civilian passenger voyage on Oct. 17, 1946. On July 30, 1947, she set up a new (unofficial) Atlantic record by making passage from Bishop's Rock to Ambrose Light in 3 days 5 hours and 50 minutes, beating the official record by nearly 15 hours.

Queenhithe (Mid. Eng. *hithe*, haven). London street and dock, lying S. of Upper Thames Street. Early in the 10th century it belonged to a Saxon, Ethedred. In the time of Stephen the property of the priory of Holy Trinity, Aldgate, subject to certain grants to S. Katharine's hospital and other charities, it became the chief water gate of the city; tolls levied on corn, etc., lander here formed part of the revenue of queens consort. Henry III confirmed its gift by Richard, earl of Cornwall, to the city in exchange for a rent of £50 per annum. Queenhithe, known as Cornhithe in the 12th century, was the site of London's first fish market. The 12th century church of S. Michael, known as S. Michael-de-Cornhithe and S. Michael ad Ripam, was restored in 1624, burnt 1666, rebuilt by Wren, 1670-83, and demolished in 1876, when the parish was united with that of S. James, Garlickhithe. The gilded vane on the rectory, representing a grainship, was taken from the old church. Queenhithe gives its name to one of the city wards.

Queen Mab. Philosophical poem by Shelley. It was first published in 1813; parts of the poet altered and revised in 1816 as *The Daemon of the World*. Written when the poet was 18, it shows all his early command of poetic language and rhythm in its part regular, part irregular, blank verse, and expresses the views of a youthful rebel against accepted religious beliefs. *See Mab.*

Queen Mary. British liner. Laid down at Clydebank in April, 1931, as No. 534, her construction was suspended at the end of the year owing to economic depression, and was not resumed until 1934. She was launched by Queen Mary on Sept. 26, 1934, and made her maiden voyage to New York on



Queen Elizabeth. The 85,000-ton Cunard-White Star liner which was launched in Sept., 1938, and set up an unofficial Atlantic speed record in 1947

By courtesy of Cunard-White Star, Ltd

of a class which included the *Barham*, *Malaya*, *Warspite*, and *Valiant*. Built at Portsmouth Dockyard, she was commissioned in Dec., 1914. Displacing 35,000 tons fully laden on a length of 643 ft. and a beam of 104 ft., she was

she was converted into a troopship. She began troopship in April, 1941, and during her war service carried 811,324 men and steamed 492,635 m. to Allied ports all over the world. In 1943 she operated an Atlantic shuttle

May 27, 1936. Displacing 81,235 tons on a length of 1,019 ft. and a beam of 118 ft., she is powered by geared steam turbines developing 158,000 h.p. and driving four propellers to give a service speed of 29 knots. She can accommodate 2,000 passengers and has a crew of 1,050. In 1936 she made a record Atlantic crossing by

provides training in medicine, in conjunction with the London hospital. There is a faculty of arts.

Queen Mary Land. Coastal tract of Antarctica. It lies E. of Kaiser Wilhelm II Land (*q.v.*), in lat. about 96°–100° E., and is bounded by Davis Sea and Shackleton Shelf, and holds Denman and Northcliffe glaciers. Its

4th duke, who has a separate entry, died in 1810, when the titles were separated. The dukedom and estates passed to the 3rd duke of Buccleuch; they included Drumlanrig Castle, Dumfriesshire. The marquessate passed to Sir Charles Douglas (1777–1837), who became the 5th holder, and from him the titles passed to his son and other descendants. The 8th marquess, John (1844–93), was the sportsman who drew up in 1867 the boxing rules called by his name. He was the father of Lord Alfred Douglas (*q.v.*). In 1920 Francis (b. 1896) became the 10th marquess. The peer's eldest son is known as Viscount Drumlanrig. *See* Boxing.

Queensberry, JAMES DOUGLAS, 2ND DUKE OF (1662–1711). Scottish politician. He was born Dec.



2nd Duke of Queensberry

18, 1662, and became a privy councillor of Scotland, 1684, but joined the army of the prince of Orange on Nov. 30, 1688. He succeeded his father as duke of Queensberry, March 28, 1695, and in 1700 was appointed high commissioner of the Scottish parliament. In 1702 he became secretary of state. Prominent in bringing about the union of the parliaments in 1707, Queensberry was rewarded with the Garter. Subsequently a commissioner to the first parliament of Anne, he acquired the name of the Union Duke, and he closed the last Scottish parliament, Jan. 6, 1707. His reception in England after this event was a "progress of triumph." A pension of £3,000 was granted and in 1708 he was created duke of Dover, marquess of Beverley, and Baron Ripon. He was also made a secretary of state, and died July 6, 1711.

Queensberry, WILLIAM DOUGLAS, 4TH DUKE OF (1724–1810). Born Dec. 16, 1724, he succeeded his father as earl of March in 1731. Unsuccessful in his claim to the peerage of Cassilis (1759), he was a representative peer for Scotland from 1761 to 1784, and became duke of Queensberry, Oct. 22, 1778. Under the title of



4th Duke of Queensberry



Queen Mary. This 81,000 ton Cunard-White Star liner, launched in Sept., 1934, broke the record for the Atlantic crossing on four occasions
By courtesy of Cunard-White Star, Ltd.

steaming from Bishop's Rock to Ambrose Light (2,907 m.) in 4 days and 27 min., and a few weeks later reduced that time by 30 minutes. The French liner Normandie regained the record in 1937, but in 1938 lost it again to the Queen Mary, which covered the course in 3 days 21 hours and 45 min., two voyages later reducing this time to 3 days 20 hrs. 42 mins.

In New York in Sept., 1939, the Queen Mary was moved to Sydney in March, 1940, and converted into a troopship, visiting Australia and S. Africa, and on her first voyage from New York to Cape Town reducing the previous record of 19 days to 12. Altogether she travelled over 1,000,000 miles and carried nearly 3,000,000 men. In Oct., 1942, she collided in the Atlantic with the anti-aircraft cruiser Curaçoa, the latter being sunk with heavy loss of life. After the war in Europe the Queen Mary was used for repatriating U.S. forces and taking British wives of U.S. soldiers to America. Derequisitioned early in 1947, she left Southampton, July 31, 1947, on her first post-war civilian passenger voyage.

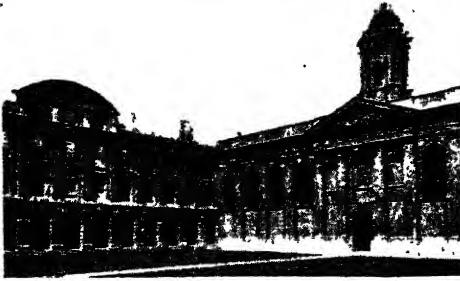
Queen Mary College. Educational institution in Mile End Road, London, E.I. Originally founded as a technical school in connexion with the People's Palace (*q.v.*), with money grants made by the Drapers' Company, it became a recognized school of London university in 1907, then being called the East London College. In 1934 Queen Mary presented it with a royal charter and it was then incorporated as Queen Mary College. With over 800 students it specialises in science and engineering, and also

coast line touches the Antarctic Circle. It was explored by the Mawson Australasian expedition of 1911–14.

Queen's, AND QUEEN'S OWN. Prefix given to a number of regiments in the British army. The Queen's is the popular designation of the Royal West Surrey regiment (*see* West Surrey Regt.), and the 16/5th Lancers. Queen's Own is a designation used in the titles of the 4th and 7th Hussars and the Cameron Highlanders. The 9th Lancers is officially the 9th (Queen's Royal) Lancers. *See* Hussars; Lancers.

Queens. Borough of New York City, U.S.A. It is situated on Long Island, and includes Long Island City, Jamaica, Newtown, part of Hempstead, and several islands in Jamaica Bay. Much of the borough is land that has been reclaimed or filled in from waste. Queens was made a borough in 1898. Area, 103 sq. m. Pop. 1,297,634. *See* New York.

Queensberry, MARQUESS OF. Scottish title held by the family of Douglas since 1682. In 1633 Sir William Douglas, lord of Drumlanrig, was created earl of Queensberry; he had been a baron and a viscount since 1628. His grandson, William (1637–95), 3rd earl, was made a marquess in 1682 and a duke next year. His son James was made duke of Dover and marquess of Beverley in 1708. These titles passed by special remainder to his second son, Charles, the eldest being an imbecile. On his death in 1778, the English titles became extinct, but the Scottish ones and the estates passed to William Douglas, earl of March, a descendant of the 1st duke. This strange being, the



Queen's College, Oxford. Front quadrangle with entrance from the High Street

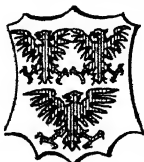
Baron Douglas of Amesbury he was created a peer of Great Britain in 1786. In politics he figured only as a supporter of the prince of Wales in opposition to George III's ministers, and subsequently became contemptuously known to the town as "Old Q." and, living at No. 138 in that thoroughfare, as the "Star of Piccadilly." McCarthy, writing of the rowdies of that period, distinguishes Queensberry as the "worst and basest spirit of the gang." He died Dec. 23, 1810. *See* Piccadilly.

Queensbury. Locality in the W. Riding of Yorkshire, England. Part of the urb. dist. of Queensbury and Shelf, it lies 4 m. N. of Halifax, 5 m. S.W. of Bradford, and has a rly. station. Pop. 5,763. Another Queensbury, a dist. of the bor. of Wembley, Middlesex, has a station on the Bakerloo line.

Queen's Channel. Indentation on the coast of Northern Territory, Australia. It is in the S.W. corner of Arnhem Land, and receives the Victoria river.

Queen's Club. London athletic club. Founded in 1886, it is at West Kensington, London, W. Its objects are to provide various games for members, who have courts for tennis, lawn tennis, squash, and fives, also a club house. Formerly there were a football ground and running track.

Queen's College. College of Oxford University. It was founded in 1340 by Robert de Eglesfield, who was sometime chaplain to



Queen's College, Oxford, arms

Philip, queen of Edward III. Its visitor is the archbishop of York, and from its opening it has had a special connexion with the north of England, some

every Christmas Day at dinner a boar's head is carried into the hall and an old carol is sung. The college owns much valuable land in Southampton. Henry V (as prince), Wycherley, Addison, Collins, Bentham, and Pater were up at Queen's. *See* Oxford.

Queens' College. College of Cambridge University. Founded 1448 by Margaret of Anjou, wife of



Queens' College, Cambridge, arms

Henry VI, with the assistance of Andrew Docket, rector of S. Botolph's and principal of S. Bernard's hostel, it was described as "The Queenes collage of sainte Margarete and sainte Bernard." Refounded in 1465 by Elizabeth Woodville, wife of Edward IV, and provided by statutes of 1475 with a president and 12 fellows, Queens' retains much of its early architectural character. The E. front was restored in 1875 and the hall in 1875 and 1909. The existing chapel dates from 1891, its predecessor now serving as a lecture-room and library annexe. New buildings were erected on the W. of the river in 1935. Famous men associated with the college are S. John of Rochester (Bishop Fisher); Whitgift; Fuller, the antiquary; and pre-eminently Erasmus, after whom a tower and court are named.

Queen's College. London college for the higher education of women. It was established in Harley Street in 1848, by F. D. Maurice and other professors of

all scholarships were given to boys from these counties. Its head is the provost. The buildings face the High Street; in the classical style, they have been attributed to Wren and Hawksmoor, and the most interesting part is the library, which contains some rare books. At Queen's

King's College, with the aid of the Governesses' Benevolent Institution, and was incorporated by royal



Queen's College, London. The facade of this Harley St. college for women

charter in 1853. The college is self-supporting, and the course extends over four years. *See* Beale, D.; Maurice, F. D.

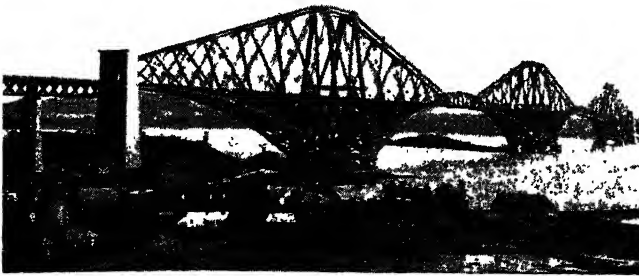
Queen's County. Former name of an inland co. of Eire, since 1922 known as Leix or Laoighis (*q.v.*).

Queensferry, NORTH. Village of Fife, Scotland. It stands on a peninsula on the N. side of the Firth of Forth, opposite S. Queensferry. With a rly. station it is visited in summer for bathing. It is the terminus of a half-hourly ferry service by diesel electric boats. Pop. 1,300.

Queensferry, SOUTH. Royal and mun. burgh and seaport of West Lothian, Scotland. It stands on the Firth of Forth, at the S. end of the Forth Bridge (*q.v.*), 9 m. W. by N. of Edinburgh, and has a rly. station. The principal industry is connected with the preparation of oil. Near Rosyth, it was a naval centre during the First Great War. Buildings include the Norman church of Dalmeny, the town or public hall, and



Queens' College, Cambridge. College buildings seen from the banks of the Cam



North Queensferry, Fife, Scotland. The village overshadowed by the N. span of the Forth Bridge

a memorial hall built by Lord Rosebery in memory of his wife. Queensferry was made a burgh in 1363. Pop. approx. 1,800. Near are Dalmeny and Hopetoun House, seats of the earl of Rosebery and the marquess of Linlithgow; also Barnbogle and Dundas Castles. The name Queensferry is due to the fact that from here Margaret, wife of Malcolm Canmore, frequently crossed the Forth when travelling between Edinburgh and Dumbarton. It is mentioned in Scott's *Antiquary* and Stevenson's *Kidnapped*, the former immortalising the Hawes Inn.

Queen's Hall. Former London concert hall, in Langham Place, W.1. Designed by T. E. Knightley, it was built in 1893, and consisted of two halls, the larger accommodating 2,492, and the smaller being at first used for recitals and exhibitions. It had 17 exits into three streets, the grand circle being on street level. The organ was built by Hill. The hall was opened Dec. 2, 1893, with a choral and orchestral concert conducted by Cowen. In 1895 was formed the Queen's Hall orchestra, with Robert Newman as manager and Henry Wood as conductor, and promenade concerts (*g.v.*) were inaugurated. After the closing of S. James's Hall in 1905, Queen's Hall was London's chief musical centre until it was destroyed in the German air raid of May 10, 1941. Consult Queen's Hall, R. Elkin, 1944.

Queensland. State of the Australian Commonwealth, the largest and most northerly of the three eastern states. The area of the state is 669,833 sq. m., of which 360,000 sq. m. are within the tropics. Off the N.E. coast is the Great Barrier Reef which consists of a formation 1,250 m. long of innumerable coral reefs, isles, and shoals enclosing an area of 80,000 sq. m. The many rivers fall into three groups. The Fitz-

roy, Burdekin, and Brisbane flow to the E. coast; the Flinders, the largest river in the state, and Mitchell flow into the gulf of Carpentaria; Cooper's Creek and other streams drain S.W. to the area of internal drainage in the heart of the continent. The Great Dividing or Main Range is continued N. from New South Wales at a lower elevation. The highest

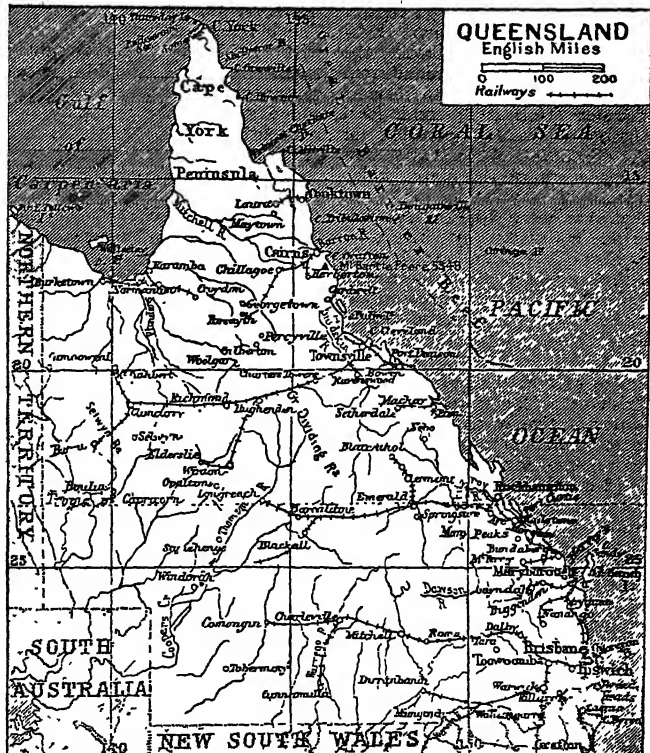


Queensland arms

peak in Queensland is Mt. Bartle Frere, 5,438 ft.

Most of Queensland experiences two distinct seasons, a warm, wet summer and a dry, relatively cool winter. Mean temps. vary from about 80° to 90° F.; at Cairns in the N.E. the rainfall exceeds 180 ins. annually. Hurricanes frequently occur along the coast during the hot months, reaching a maximum in late summer. The S.W. is arid, semi-desert scrubland, the W. slopes are grassland or savanna where eucalypts alternate with scrub, the E. slopes are forested mainly with eucalypts, and the coasts are heavily forested with typical mangrove swamps along the shore. Much of the W. falls within the area where underground water is tapped by artesian bores; there were 2,047 bores in 1945, and water was flowing from 1,358 of them.

Sheep rearing is an important industry, over 23,000,000 sheep being pastured in the great natural grasslands of the interior, or on the Darling Downs. Wool accounts for more than half the value of overseas exports. Cattle are the main livestock: there are a million and a half dairy cattle



Queensland. Map of this half-tropical state of the Australian Commonwealth

and over 5,000,000 beef cattle. They thrive on all the coast lands.

Queensland is the only country to produce cane-sugar with white labour only. Production in 1945 was more than 650,000 tons. Less than seven tons of cane were needed to manufacture a ton of raw sugar—a world record. Other main crops are wheat, maize, fruits, cotton, potatoes, and tobacco. Queensland forests yield very fine woods, as well as much utilitarian pine and hardwood. Gold and tin are mined in considerable quantities, and copper, manganese, and iron ores obtained. Coal mined at Ipswich and other centres is used chiefly as bunker coal on the coasting steamers. Thursday Island is a centre for the pearl and bêche-de-mer fishery. Manufactures are confined almost entirely to the production of food-stuffs and articles of clothing, mostly for local use. More than 6,500 m. of rly., nearly all state-owned, connect the chief centres of Normanton, Cooktown, Cairns, Townsville, Mackay, Rockhampton, Maryborough, and Brisbane. Main roads in 1945 were 17,183 m. in extent, of which two roads each some 400 m. long were built for defence purposes in 1942. One connected Mt. Isa in central Queensland with the Stuart Highway (g.v.) at Tennant Creek; the other ran about 80 m. inland from Duaringa via Clermont to Charters Towers. Until 1938 small local authorities were responsible for the generation of electricity, now the concern of the state, which owned 47 stations in 1945. In that year nearly 70,000 acres were made cultivable by irrigation. In May 1948, cultivation of 300,000 acres in mid-western Queensland for coarse grains and sunflowers was started by the Queensland British Food Corp'n.

Administration and Education

The seat of the government is Brisbane. The governor is the representative of the king. The state parliament has only one house—the legislative assembly of 62 members elected every three years on an adult male and female franchise based on a short residence qualification. There is a prime minister, who is vice-president of the executive council consisting of himself and nine other ministers; 16 members are sent to the federal house of representatives and 10 to the senate.

Primary education is free, secular, and compulsory up to the age of 14. Secondary education, which is also free, depends upon

examination tests. There are also a certain number of free places at Queensland university in Brisbane which was founded in 1911. Tuition by correspondence is well organized.

In 1945 the population was 1,085,681. There are in addition about 19,000 aborigines maintained on government or mission settlements and stations.

Although Torres, Cook, and Flinders visited the coasts, the country was virtually rediscovered by Oxley in 1823. Immigration began by the spreading out over the Darling Downs and beyond of squatters seeking pasture for their sheep. By 1859, when the colony was separated from New South Wales, the pop. numbered 25,000, and a rapid increase in numbers followed the gold discoveries, 1866–79. *See* Aborigines; Australia; *consult also* Queensland Politics during Sixty Years, C. A. Bernays, 1919; Then and Now, F. Alexander, 1935; Flying Fox and Shifting Sand, F. Ratcliffe, 1938; Undiscovered Australia, G. H. Wilkins, 1938.

Queensland, UNIVERSITY OF. Seat of higher education, situated at Brisbane, Queensland, Australia. It was established in 1909. The buildings include the library with 84,000 vols., and the central technical college, in addition to classrooms, laboratories, etc. In connexion with the university are residential colleges belonging to religious denominations, and one for women. The senate is the governing and managing body. Of its 20 members, 10 are appointed by the governor in council, 10 are elected by the council of the university. The faculties are: arts, science, engineering, commerce, agriculture, law, dentistry, veterinary science, and medicine. Correspondence courses are available for those who live remote from the university. There is an annual state grant of £40,000 as well as an income of £8,000 from a bequest of £200,000 made by Sir Samuel McCaughey.

Queen's Messengers. Civil defence organization in the U.K. founded during the Second Great War. Brought into being as a result of the air raids in 1940, they were convoys sent by the ministry of Food to carry food and comforts to badly bombed towns. A unit consisted of a water tanker holding 300 gallons; two food lorries with soup boilers, fuel, and utensils; and three mobile canteens. Five motor cyclists completed the con-

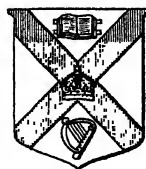
voy. Of the fleet of 18 Queen's Messengers ready for duty in 1941, the first was the gift of Queen Elizabeth, and the remainder were presented by the American war relief organization.

Queen's Park. A suburb of Glasgow, Scotland. Noted for its football club (the leading amateur club of Scotland, not to be confused with Queen's Park Rangers, a London club, in 1948 promoted to the Second Division of the football league), it contains a recreation ground and a museum. *See* Glasgow.

Queenstown. Town of Tasmania, Australia. It stands on the Queen river in Montagu co., 23 m. N.E. of Strahan, its port. The terminus of the Mt. Lyell Company's rly., it contains reduction works for copper mined at Mt. Lyell, saw-mills, and brickworks. Pop. 3,800.

Queenstown. Town of the Cape Province, S. Africa. It stands on an elevated plateau, 3,500 ft. high, between the Stormberg and Katberg Mts. and near the Great Kei river. It is on the rly., 154 m. N.W. of East London. There is a botanic garden. The town is the centre of a district producing wheat and wool. Queenstown, founded in 1853 and named after Queen Victoria, is laid out in the form of a hexagon. Pop. (European) 8,136.

Queen's University, BELFAST. Northern Irish university. Founded in 1909, it was formerly Queen's College, which, established in 1849, was one of the three colleges in the royal university of Ireland. The latter was dissolved in 1909, when Queen's College itself was made a



Queen's University, Belfast, arms

university. It has eight faculties—arts, science, law, medicine, applied science and technology, agriculture, theology, and commerce—and admits women equally with men to its classes and degrees. The university is entirely non-residential, and affiliated to it is the municipal technical institute, an educational centre in Belfast. The university is governed by a senate of 44, four of whom are nominated by the crown, one being a woman; others are elected by Belfast and Londonderry corporations.

Queen's University. Canadian university at Kingston, Ontario. Founded in 1841 by members of the Presbyterian Church, it was at first mainly a theological centre.

In 1854 a faculty of medicine, and in 1893 a faculty of applied science, were added. In 1912 the faculty of theology, though still part of the university, was separated and became Queen's technical college under the United Church of Canada. The university itself is undenominational. Its buildings include a valuable library, museums, and laboratories. The degrees are open to men and women.

Queen's View. Rocky spur in Perthshire, Scotland. On the road between Pitlochry and Tummel Bridge, it overlooks Loch Tummel and gives a prospect of Schiehallion and the Shepherds of Etive. The name was given in compliment to Queen Victoria, who alighted here to admire the view.

Queensway. Official name of Mersey Tunnel (*q.v.*). It is also the name of the station which serves the street of Queensway, Bayswater, on the Central London line of the London underground rly.

Quelpart. Island belonging to Korea (Chosen). Situated at the S.W. entrance of the strait of Chosen, 53 m. S. of the S. extremity of Korea, it is a rock-bound island, encompassed by islets, and measures 45 m. in length and 21 m. in breadth. Its surface is hilly and well forested, Mt. Auckland, the culminating height, reaching to about 6,500 ft.

Quenching. Relatively rapid controlled cooling of a metal by artificial means after heat-treatment. Its object is to suppress undesired transformations or changes which might take place within the crystal structure of the metal, if allowed to cool slowly. Different speeds and ranges of cooling are required with different metals, to obtain the desired conditions. Quenching may be carried out by rapid immersion of the heated metal into a medium such as a molten metal or salt bath, an oil bath, a cold water bath, a chilled brine bath, or by holding it in a blast of cold air. Each method gives its own particular cooling rate and finishing temperature.

Quennell, PETER (b. 1905). British writer. The son of C. H. B. and Marjorie Quennell, joint authors of *A History of Everyday Things* in England, 1918-34, he was educated at Berkhamsted grammar school and Balliol College, Oxford, and contributed to *Life* and *Letters*, *The Criterion*, and other reviews. In 1930 he was appointed to the chair of English literature at Tokyo university. A novelist, early influenced by Proust, an essayist, and an art

critic, he wrote a vivid travel book, *A Superficial Journey*; *Aspects of 17th Century Verse*; studies of Byron; Caroline of England; Four Portraits (Boswell, Gibbon, Sterne, and Wilkes); and a life of Ruskin. He also translated de Gramont's memoirs, and edited Princess Lieven's letters to Metternich and Byron's letters and diaries. From 1944 he edited the *Cornhill Magazine*. See *Biography*.

Quentin Durward. Romance of France and Flanders in 1468, by Sir Walter Scott, the seventeenth of the Waverley novels, published in June, 1823. It was the first novel in which Scott ventured on foreign ground, and is one of the finest romances in the language. The titular hero is a young Scot who seeks his fortunes in France, becomes a member of the King's Scottish guard, champions the young and beautiful Isabelle de Croye, and by his good sense, firmness, and gallantry is put in possession of wealth, rank, and beauty. King Louis XI, Charles the Bold, duke of Burgundy, William de la Marck, Cardinal Balue, and Philippe de Comines are fine portraits, and the Bohemian scenes are noteworthy.

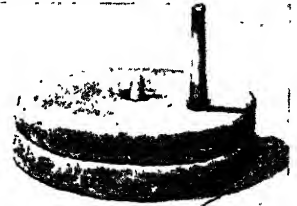
Quercus. Generic Latin name for the oak (*q.v.*).

Querétaro. Interior state of Mexico. Part of the plateau of Anahuac, it is situated between Hidalgo and Guanajuato, and covers an area of 4,432 sq. m. The N. part is mountainous, but elsewhere fertile valleys produce maize, fruit, sugar, and cotton. Mining is carried on. Pop. 244,737.

Querétaro. City of Mexico. Capital of the state of the same name, it stands on a plateau 6,170 ft. high, 110 m. N.W. of Mexico City on the National rly. Water is brought to the city by a Spanish aqueduct of 74 arches, 80 ft. high. The movement for independence began at Querétaro, and here, in 1867, the emperor Maximilian was shot. The Maximilian chapel was erected in 1901. Pop. 33,629.

Querfurt. Town of Germany. Situated on the Querne, a tributary of the Saale, on the branch rly. to Merseburg and 20 m. W. of that town, it possesses a Romanesque church and a castle dating from the 14th and 15th centuries. There are sugar refineries, cotton factories, breweries, and a horse market. Before 1635 Querfurt was the capital of a little independent state. In 1635 it became part of Saxony and in 1815 part of Prussia. After the Second Great War it came within the Russian zone of occupation.

Quern (A.S. *cweorn*, akin to corn). Primitive grain-mill, usually of stone. In Neolithic times—early



Quern, a primitive form of grain-mill

Egypt, Palestine (Deut. 24, v. 6), ancient Mexico (metate)—an oval grinder was rubbed upon a saddle-stone. Irish bullans and rock-basins mark the transition to the pair of disks, the nether with a vertical spindle engaging in a funnel-shaped hole through the upper, rotated by a wood handle. Querns were used to a large extent in Scotland down to the beginning of the 19th century.

Quesnay, FRANÇOIS (1694-1774). French economist. Born June 4, 1694, at Méré, in the dept. of Seine-et-Oise, the son of a small landed proprietor, he came to Paris and studied surgery and medicine, becoming court physician to Louis XV in 1752. He is best remembered for his writings on political economy. His *Tableaux Économiques*, published at Versailles, 1758, and rediscovered, 1890, made him the leader of the Physiocrats (*q.v.*). Adam Smith in *The Wealth of Nations* (Book iv, ch. 9) devotes considerable space to Quesnay's theory. Quesnay contributed articles to the *Encyclopédie*. His collected works were published by A. Oncken, 1888. He died Dec. 16, 1774. See *Political Economy*. *Pop. Kay-nay.*

Quesnel, PASQUIER (1634-1719). French theologian. Born in Paris, July 15, 1634, and educated at the Sorbonne, he entered the Congregation of the Oratory in 1657, and was ordained priest in 1659. The Jansenist tone of the first part of his *Réflexions morales sur le*



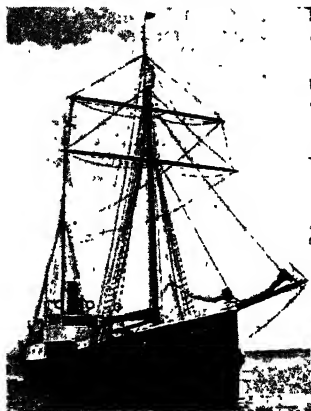
François Quesnay, French economist



Pasquier Quesnel, French theologian

Nouveau Testament, 1671, and the Gallicanism of his edition of the works of Leo the Great won for him the enmity of the Jesuits. Refusing, in 1684, to sign the anti-Jansenist formula, he had to flee to Brussels, where the first collected edition of the *Réflexions* appeared in 1687. Quesnel was imprisoned in 1703, but escaped to Amsterdam, where he resided until his death, Dec. 2, 1719. An English edition of the *Réflexions* appeared in 1719-25. *Pron.* Kaynel.

Quest. British exploration ship. Built in Norway, 1917, of oak, pine, and fir, she was specially con-



Quest. The British exploration ship, specially built for Arctic waters

structed for voyaging in Arctic waters, and was at first used as a sealer in the White Sea. She was 111 ft. long, 23 ft. in beam, and about 200 tons net burthen. Her sides were 2 ft. thick of solid oak, sheathed with steel. In 1921, after being altered and refitted, she was used to convey the Shackleton-Rowett Antarctic expedition party. Accommodation for the scientific staff and laboratories was built above and below decks. She returned to England on the abandonment of the expedition, 1922. *See* Antarctic.

Quetta. Capital of Baluchistan, Pakistan. At 5,500 ft. alt. among mts., it is a military outpost N.W. of, and guarding, the Bolan Pass, through which the strategic rly. from Quetta goes to the Indus valley. It is W. of the Harnai Pass, which also carries a strategic rly. From Quetta one rly. goes to Chaman on the Afghan frontier, overlooking the plains of Kandahar, and a second line goes to Nushki and then farther W. to the Persian frontier at Mirjawa. The town is a trade centre, but the winter cold drives away about a

quarter of the population. It had a staff college, the Camberley of the Indian army, until the transfer of power in 1947. Its growth dates from 1876, when the residency was established. A disastrous earthquake did heavy damage here in May-June, 1935, when 40,000 people were buried in the ruins of their homes. Pop. 64,476.

Quetta Pishin. Dist. of Baluchistan, Pakistan. It extends E. from the frontier of Afghanistan and is very mountainous, parts being as high as 11,700 ft. The rainfall varies from 6 to 10 ins. annually. It is crossed by the rly. from Quetta to Chaman through Pishin. The people are nearly all Pathans; there are a few Brahui in the S.W. Area, 5,310 sq. m. Pop. 156,289.

Quetzal or **QUEZAL** (*Pharomachrus mocinno*). Bird of the trogon family, inhabiting the central American uplands from Guatemala to Panama. Distinguished by resplendent plumage, its name is derived from an ancient Nahua word meaning green-feather. The cock bird, the size of a dove, is adorned with carmine breast-feathers and upper tail-coverts of metallic green, projecting one to three ft. beyond the tail.

The ancient Mexican chiefs forbade the killing of the birds, whose plumes were plucked and sent to them as tribute for their personal wear on head-dress and mantle. The plumes were preserved as heirlooms, and representations of them occur on Maya pottery, sculpture, and picture-writings. The bird, emblem of liberty, forms part of the national arms of modern Guatemala, and the quetzal is the unit of Guatemalan currency, equal to a U.S. dollar. *See* Birds colour plate.

Quetzalcoatl. One of the chief gods of ancient Mexican mythology, god of the air and of wisdom and teacher of the arts. His name signified serpent (coatl) clothed with green feathers (quetzal, *q.v.*). He was said to have ruled in Mexico in a time of peace and plenty, and when driven away by the sorceries of a rival he said that he would return; a legend which proved help-



Quetzalcoatl. Image of the Mexican god

ful to Cortés, who may well have seemed to a superstitious people the returning god. *See* Mexico.

Queue (Fr., tail). This term, first applied in France to an orderly line of people awaiting turns for bus or tram, has entered the English language, with the anglicised *pron.* kew, but is no longer connected specifically with transport. Queues for all purposes are common, their general voluntary acceptance marking acknowledgement of the fair principle of "First come, first served" rather than that of disorderly scramble. An earlier English use of the word, with the same *pron.*, applied it to the short pigtail worn, *e.g.*, by sailors.

Queuille, HENRI (b. 1884) French politician. *See* N.V.

Quevedo y Villegas, FRANCISCO GOMEZ DE (1580-1645), Spanish courtier and writer. Born at Madrid, he was educated at Alcalá university. He was attached to the court of the king of Spain, and later was secretary to the viceroy of Naples. In 1621 he returned to Spain, where he resided at the court, and amused himself and others by a constant succession of writings, many of them satirical. On a charge of having libelled the king he was imprisoned in 1639. Released in 1643, he died Sept. 8, 1645.

Quezaltenango. Dept. of S.W. Guatemala, Central America. It is bounded S. by the Pacific Ocean, is mountainous, and contains the active volcano Santa Maria, 12,355 ft. in height. The chief products are coffee, sugar, rubber, wheat, maize, and cattle. Population est., 120,000. Quezaltenango, the capital, lies 75 m. W.N.W. of the ruined capital, Guatemala la Nueva. It is built on a plateau at an alt. of 7,700 ft. The second largest town in the republic, it manufactures cotton, linen, and woollen goods, and trades in agricultural produce. Pop. 30,125.

Quezon, MANUEL LUIS (1878-1944). Philippine statesman. He was born on Aug. 19, 1878, at Baler, Luzon, and studied law at Manila university. He joined Aguinaldo (*q.v.*) during the insurrection that followed the Spanish-American war, 1898, and went to Washington, 1909, as a Philippine commissioner. He was elected president of the Philippine senate in 1916, remaining in office until his election as 1st president of the new commonwealth in 1935, and was re-elected in this post, 1941. When the Japanese invaded the Philippines he gave the fullest support to the U.S. Quezon left the

commonwealth after the fall of Manila and in May, 1942, established a provisional government in Washington. He sat on the Pacific war council. He died at Saranac Lake, N.Y., Aug. 1, 1944. His widow was killed by bandits, April 28, 1949, while journeying to open a hospital at Baler, Luzon.

Quia Emptores (Lat., whereas buyers). Opening words, used as the name of an English law passed in 1290. It was directed against the alienation by the lords of parts of their land and the consequent creation of fresh manors, a practice which tended to reduce the chances that such land would revert, owing to the failure of heirs or for other causes, to the king or other overlord. The law of 1290 provided that if a lord alienated some of his land, the new tenant would hold such land direct from the overlord, to whom it would return in case of escheat.

Quiberon. Town of France, in the dept. of Morbihan. It stands at the S. extremity of a peninsula which forms the W. land boundary of the Bay of Quiberon, 21 m. S.W. of Vannes. The peninsula is connected with the mainland by a seawall, and is defended by Fort Penthièvre. A rly. runs along the peninsula to the junction at Auray. At St. Pierre, on the E. coast, are menhirs and dolmens, and at the N.W., on the mainland, are the remarkable prehistoric monuments of Carnac (*q.v.*). There are two harbours, Port-Maria and Port-Haliguen, whence during summer steamer connexion is kept up with Belle-Île-en-Mer (*q.v.*), where Sarah Bernhardt transformed an old fort into a villa residence.

Quiberon is a convenient point from which to visit the gulf of Morbihan (*q.v.*), which is almost landlocked by the peninsulas of Rhuis and Locmariaquer, the channel between these being only half a mile wide. There are firm sands, and a small bathing establishment. On June 14, 1795, some thousands of French émigrés were landed by a British fleet at Carnac. They hoped to join the peasant revolt against the Convention. There were some veteran Chouan troops under Sombreuil, but the raw volunteers lacked discipline and adequate leadership. Much time was lost in disputes, and though the men fought gallantly at Quiberon and Fort Penthièvre, they were defeated by Hoche, a storm preventing the English vessels from rendering much aid. Sombreuil and about 900 survivors surrendered under the mistaken

impression that their lives would be spared. Sombreuil, the bishop of Dol, and 20 others were shot at Vannes; the rest in the Champ des Martyrs at Auray.

Quiberon Bay, BATTLE OF. Fought between the British and the French, Nov. 20, 1759. During the Seven Years War the French



Quichua. Two members of this S. American Indian tribe

planned an invasion of England. An army was assembled under the duc d'Aiguillon, which was to embark at Vannes, convoyed by the fleet of Conflans, while a squadron under Thurot, making a diversion against the coasts of Scotland and Ireland, decoyed the English Channel fleet away.

De la Clue was attempting to join Conflans at Brest, but was utterly defeated by Boscawen on Aug. 18. Meanwhile the troops had been assembled in the neighbourhood of Quiberon, and on Nov. 14 Conflans put to sea from Brest to safeguard the transports if he could. Hawke had been driven to Torbay by a great gale, but the wind that enabled Conflans to get out from Brest brought Hawke also to sea. Quiberon Bay lies about 150 m. S.E. of Ushant, and is protected on the W. and S.W. by the Quiberon peninsula, Belle Isle, and the dangerous rocks of the Cardinals. There Conflans hoped to remain until another gale should blow Hawke from his blockading station to shelter.

Conflans, making his way to Quiberon, did not suppose that his adversary would risk his fleet amid uncharted and dangerous rocks, with a gale blowing, on a grey day in Nov. But Hawke had measured the hazard. The signal was hoisted for a chase, and the English pressed on through the islands and shoals and towards a lee shore, and, ranging on both sides of the fleeing French, each ship fired her broadside and left the destruction to those who followed. English ships

were lost on the rocks, but the French fleet was utterly broken, some ships were captured, others lost or struck, and the flagship, *Soleil Royal*, was driven on shore and burned. Hawke's victory, which was without precedent, was complete; the French plan of invasion was shattered and the English command of the sea assured.

Quiché or **KICHÉ.** American Indian tribe of Maya stock in S. Guatemala. Now agricultural peasants, they were at the Spanish conquest the most powerful tribe in Guatemala, with a fortified capital at Utatlan. The allied Cakchikel were S.E. of them. In the 17th century a Christianised Guatemalan wrote in Quiché from local tradition an epic, *Popol Vuh*, recounting early migrations and tribal history. See Maya.

Quichua. South American Indian tribe and stock in Ecuador, Peru, and Bolivia. In the 13th century, led by the Inca clan, they absorbed earlier cultures established by the coast Yunca near Trujillo and by the upland Aymara or Colla round Lake Titicaca. At the Spanish conquest they ruled from Ecuador to Chile, a region 2,500 m. long, with cultural offshoots as far as the Argentine Calchaqui. The llama was domesticated for transport, the alpaca for wool. The political system was a state socialism under the autocratic rule of the Inca as priest-king. Roads and bridges betokened a highly systematised government, whose records were kept by quipus or knotted cords. The Quichua language is spoken today, from Quito to Argentina, by more than 2,000,000. It has given to Europe words like condor, guano, pampa. See Bolivia.

Quickening. First perception by the mother of the movements of the foetus while in the womb, generally felt about the end of the fourth month of pregnancy (*q.v.*).

Quicklime. Common name for calcium oxide, CaO. It is prepared on a large scale by burning limestone (calcium carbonate) mixed with coal in kilns. The limestone loses its carbon dioxide gas during the process. Shaft and rotary kilns are in general use. The lime-burning process is a continuous one, the limestone and coal being placed in the top of the kiln and the quicklime raked out at the bottom when sufficiently burnt.

Quicklime is employed for making mortar and cement for building purposes, and the product made in the manner stated varies according to the quality of the

limestone used. The builder distinguishes the quicklime obtained from a pure limestone as "fat," while that from limestone containing magnesia is spoken of as "poor" lime. Slaked lime is made from quicklime by pouring water over it, much heat being evolved during the process. The product known chemically as calcium hydroxide is used for making lime-water and in chemical industry.

Quickly, NELL. Character in Shakespeare's *King Henry the Fourth*, *King Henry the Fifth*, and *The Merry Wives of Windsor*. In the first of these, Mistress Quickly is hostess of the Boar's Head, Eastcheap. In *The Merry Wives* she is the housekeeper of Dr. Caius, the confidant of Anne Page's three lovers—Slender, Dr. Caius, and Fenton—and the go-between in the intrigues of Falstaff with Mistress Ford and Mistress Page. In *King Henry the Fifth* she is the wife of Pistol, describes Falstaff's death, and is said to have died in the Spital.

Quick Match. Simple fuse which burns rapidly and can be used for the ignition of gunpowder and similar explosives. It is generally prepared by boiling loose strands of cotton wick in a strong solution of gunpowder and gum, allowing them nearly to dry, and then, whilst they are "tacky," dusting them over with meal gunpowder. If unconfined this material burns at the rate of about twelve seconds per yard, but if enclosed in a tube burns much faster. Formerly it was used for both military and industrial blasting, but for this purpose has been entirely superseded by electric detonators, safety fuse, etc. It is now chiefly employed for fireworks, and to convey ignition rapidly to various components in certain types of shell.

Quicksand. Name given to a loose sand in which heavy bodies easily sink. Such sands are composed of small particles and water and do not coalesce under pressure. They are usually found near the mouths of rivers and in glacial deposits, and are generally small in extent. A heavy body on a quicksand behaves, as regards sinking, very much as it does in any fluid. If animals and human beings did not struggle when caught in one it is probable that they would not sink completely.

Quicksilver. Old English term, still used, for the metal mercury (*q.v.*). It was obviously suggested by the resemblance of mercury to silver and by its mobile character.

Quickstep. Type of ballroom dance with fast tempo, a variety of the foxtrot (*q.v.*).

Quickswood, HUGH RICHARD HEATHCOTE GASCOYNE CECIL, 1ST BARON (b. 1869). British politician,



Lord Quickswood,
British politician

born Oct. 14, 1869. Son of the 3rd marquess of Salisbury, he went to Eton and University College, Oxford. After serving his father as private secretary he represented Greenwich as Conservative M.P. 1895-1906, and Oxford university, 1910-37, his oratory and his compelling earnestness giving him prominence in the house. Ecclesiastical questions interested him predominantly, and as Lord Hugh Cecil he became known as a leading defender of the Church of England. He became a privy councillor in 1918, and was provost of Eton during 1936-44. In 1941 he was raised to the peerage. His publications included *Conservatism*; *Liberty and Authority*; *Nationalism and Catholicism*.

Quidde, LUDWIG (1858-1941). German historian and pacifist. Born at Bremen, March 23, 1858, he early specialised in history, founded the *German Review of historical science* in 1889, and was secretary of the Prussian historical institute at Rome, 1890-92. Two years later he attracted attention with a pamphlet, *Caligula*, directed against William II, for which he was imprisoned for three months. Member of the Bavarian diet 1907-19, he was president of the German peace society 1914-29, and a well-known figure at all international peace conferences. In 1927 he shared the Nobel peace prize with Buisson. After Hitler's advent to power in 1933, Quidde lived in Geneva. He died March 5, 1941. *Pron. Kvidda.*

Quietism. Form of mysticism which has arisen at various times and in various branches of the Church. Its distinctive principle is passivity and dependence on the manifestation of the Will of God as a guiding rule of life. Hence the Quietist practises entire resignation of self in thought, desire, and deed, and in this way seeks such union with God that the Will of God shall take the place of his own will, and his life be identified with the divine operation. Quietism has arisen in con-

nexion with various systems of philosophy and with several non-Christian religions, such as Buddhism. Meditation is the one essential practice of Quietism, but it differs from what is usually known by that term.

Christian meditation is an active mental process by which some doctrine or fact is recalled by the memory, reflected upon by the imagination, apprehended by the reason, and its lessons accepted by the will and adopted in the life. Quietism, on the other hand, teaches that meditation is not an act of the memory and reason, but is an inward, passive apprehension resulting from union with God apart from any exertion of the mind. It may be described as a kind of mental sleep which tends to self-hypnotism.

The name Quietism first came into use through the teachings of a Spanish priest, Miguel de Molinos (*q.v.*), whose book, *The Spiritual Guide*, published in 1675, ran through twenty editions in various languages in six years, and made converts of many eminent Roman cardinals and prelates. It was published in English in 1699.

Madame Guyon taught Quietism in France and was imprisoned for it in 1688 and again in 1695. She influenced Fénelon and gained adherents in France and Switzerland, but was strongly opposed by Bossuet. In Great Britain Quietism never made considerable headway, but the "inward light" of the Quakers has points in common with it. The objections raised by orthodox theologians to the system are that it tends to supersede faith in the Christian verities and to deprecate good works, and even constitutes a danger to souls by rejecting all exertion in religion and entirely excluding any struggle against evil habits or to attain good ones, or to help one's fellows. *See Hesychasts*; *Mysticism*.

Quilimane OR KILIMANE. Seaport of Mozambique. It is situated N. of the delta of the river Zambezi and 313 m. S.W. of Mozambique. It possesses an excellent harbour, and is the starting point of an important rly. to the border of Nyasaland. The dist. produces coconuts, copra, sugar, oilseeds, and sisal. Pop. 4,000, including about 500 Europeans.

Quill (Mid. E. *quille*, feather; etym. doubtful). Word used in several senses. (1) A piece of small tube or reed used by weavers to wind thread upon, and by others to carry wound silk or other thread (2) A plectrum of quill, as of a

goose, for plucking the strings of a musical instrument of the zither type. In an instrument of the harpsichord type, a piece of crow-quill, fixed on a jack, set in motion by the keys. (3) A small pipe or tube, particularly a small water pipe. (4) The hollow shaft of a seal engraver's lathe, in which the cutting tools are held during their rotation, the stones being held against them. (5) In mining, a train for igniting a blast. It comprised a quill filled with slow-burning powder, but is now superseded by a safety fuse. (6) The float of a fishing line. (7) A faucet or tap, as of a barrel. (8) A pen for writing, made by sharpening and splitting the hollow stem of a feather. (9) The spine of a hedgehog or a porcupine. *See Pen.*

Quiller-Couch, Sir Arthur Thomas (1863-1944). British writer. He was born at Bodmin,



Sir A. Quiller-Couch,
British writer

success with his first novel, *Dead Man's Rock*, 1887. He later wrote novels and stories of widely differing types, though mainly concerned, directly or indirectly, with Cornwall. These included *The Astonishing History of Troy Town*, 1888; *The Delectable Duchy*, 1893; *The Ship of Stars*, 1899; *Major Vigoureux*, 1907, and *Foe-Farrell*, 1918. His early fiction reflected the influence of Stevenson, whose unfinished novel, *St. Ives*, he completed 1899. His later work, especially *Foe-Farrell*, possibly his finest novel, shows the influence of Conrad.

Knighted in 1910, he became King Edward professor of English literature at Cambridge in 1912, his critical lectures, later published in book form as *On the Art of Writing*, 1916; *Studies in Literature*, 1918, 1922, and 1929; *On the Art of Reading*, 1920, attracting much attention. His *Oxford Book of English Verse* has been called the finest anthology since Palgrave. He also edited the *Oxford Book of English Prose*, and other anthologies, and wrote much verse, including *Poems and Ballads*, 1896. While his novels will probably be little read, except in the W. of England, Quiller-Couch

will long be remembered as critic and anthologist. He died May 14, 1944, his unfinished *Autobiography, Memories and Opinions* being published the same year. *Consuli Life*, F. Brittain, 1947. *Pron. Cooch.*

Quillota. Town of Chile, in the prov. of Valparaíso. It stands in a fine position on the river Aconcagua, 26 m. by rly. N.E. of Valparaíso and is the centre of a copper mining and fruit and wine producing district. Pop. est. 15,000. *Pron. Keel-yô-ta.*

Quillwort or **MERLIN'S GRASS** (*Isoetes lacustris*). Aquatic perennial herb of the family Isoetaceae.

It is a native of Europe, W. Siberia, and N. America. It grows at the bottom of lakes, and has a broad, flat, corm-like base, from which spring a dozen or twenty stiff awl-shaped leaves, which are composed internally of four tubes with transverse partitions. The spore capsules are of two kinds and borne within the leaf-bases.

Quilon. Town of Travancore, India. It is situated on the coast of the Arabian Sea, on one of the numerous backwaters which characterise this coast. Here the rly. from Trivandrum, 35 m. to the S.E., to Tinnevely and Madras leaves the coast. Coasting steamers make use of the backwaters and reach the town to take away for export copra, coffee, and spices. Marco Polo visited Quilon, which in the early days of Indian trade was one of the chief ports of the W. coast of the Deccan. In 1503 it was Portuguese, and in 1653 it was taken by the Dutch. Population (approx.) 21,000.

Quilp, DANIEL. One of the leading characters in Dickens's novel *The Old Curiosity Shop*. A hideous dwarf with a mind as distorted as his body, impish, cruel, and possessed of unflagging energy in the pursuit of his hatreds, he practises usury, one of his victims being Little Nell's grandfather. In the end he is drowned in the Thames while trying to evade the police.

Quilt (Lat. *culcita*, mattress). Bed-cover of down or other soft material enclosed in a fabric case. Quilting was formerly done with

the needle, a layer of wadding in terposed between upper and lower layers of cloth being stitched to form patterns standing in some relief. Loom quilting followed, a series of thick wadding threads replacing the loose fibre used as stuffing. A diversity of complex weaves are used in quilt weaving, upper and lower fabrics being woven simultaneously in the loom, while threads from the bottom fabric combine the two together; the Marseilles quilt is of this type. The satin quilt has a smooth surface with raised figures, and is made by the interplay of two separate sets of warp and two of weft. The Alhambra quilt is of rather simpler construction. The honeycomb quilt is a single fabric with a honeycomb pattern in low relief, and often with additional geometrical or floral figures. The tapestry quilt is a coloured one in which weft of different colours is used. Quilt weaving is done mainly in cotton, chiefly around Bolton and Bury, Lancashire.

Quilter, ROGER (b. 1877). British composer. He was born at Brighton, Nov. 1, 1877, was educated at Eton, and studied composition at Frankfurt. His settings of Shakespeare, notably songs from *Twelfth Night*, and *As You Like It*, appealed to such singers as Plunkett Greene and John Coates and thus became well known. His song-cycle *To Julia* (settings of Herrick), 1905, was followed by orchestral pieces, e.g. *Three English Dances*, 1910, and *Children's Overture*, and his incidental music for the fairy play *Where the Rainbow Ends*, 1911, was arranged as an orchestral suite. He also wrote the incidental music for a production of *As You Like It*, 1922, and his operetta *Julia* was produced in 1936.

Quimper. Town of Brittany, France, and capital of the dept. of Finistère. It stands on the river Odet, 36 m. S.E. of Brest. The cathedral of S. Corentin, the first stone of which was laid by Bertrand de Rosmadec in 1424, is one of the finest Gothic churches in Brittany, with beautiful lady chapel, fine choir, stained glass, mural paintings, and statuary. The ornate high altar is modern, as are the spires in the towers. There are potteries, shipbuilding yards, weaving and paper factories, and iron and copper foundries. There are a coasting trade and sardine fisheries. The town was besieged several times by the British. In 1345 it was destroyed by Charles de Blois. During the Revolution



Quillwort or
Merlin's Grass



Quimper, Brittany. Picturesque old houses above which are the twin spires of S. Corentin's Cathedral

it was known as Montagne-sur-Odet. It is the birthplace of Laennec (1781-1826), inventor of the stethoscope. In early times Quimper was the capital of Cornouailles. Pop. 20,149.

Quimperlé. Town of Brittany, France, in the dept. of Finistère. It stands at the confluence of the Ellé and the Isole, 92 m. S.E. of Brest. The church of S. Michel dates from the 14th-15th centuries, and that of Ste. Croix, restored 1862, is modelled on the church of the Holy Sepulchre at Jerusalem. Trade is carried on in wood, grain, cattle, butter, wax, honey, and hides. The place was known in the 6th century, when Gonthiern, a king of Cambria, after abdicating his throne, built a hermitage at the confluence of the two rivers. This was transformed in the 9th

century into an abbey, around which grew the modern town. Quimperlé dates its importance from 1271. Pop. 10,679.

Quin, JAMES (1693-1766). An English actor. Born in London of Irish descent, Feb. 24, 1693, and educated in Dublin, he came into notice by his rendering of Bajazet in Tamerlane at Drury Lane Theatre, London, 1715, and by killing a fellow actor in a duel. For many years he played leading parts at Lincoln's Inn Fields and Covent Garden. In 1746 he challenged comparison with Garrick, when he appeared as Horatio to his Lothario in *The Fair Penitent*, as Falstaff to his Hotspur in *Henry IV*, and as Gloucester to his Hastings in *Jane Shore*, both actors also impersonating Richard III. Quin retired in 1751, and died at Bath, Jan. 21, 1766. There is an anonymous *Life*, 1766, reprinted in revised form, 1887.

Quince. One of various trees and shrubs of the family Rosaceae, genus *Pyrus*. Native to Europe,



Quince. Branch with leaves and fruit; inset, flowers

Japan, and China, the common species was introduced into Britain in 1573. Quinces vary in height from 5 to 20 ft., and are readily propagated by layers or suckers in autumn. They flourish in moist soil. The pear-shaped, astringent, yellow fruit is used in jellies.

Quinet, PETER. Character in *A Midsummer Night's Dream*, by Shakespeare. A carpenter, he comes in as leader of six Athenian workmen and producer of the play they are to put on for Duke Theseus's wedding; but he is usually talked down by Nick Bottom. Quince, however, delivers the famous prologue in

which all the full stops are wrongly placed. See *Midsummer Night's Dream*.

Quincunx (Lat.). Arrangement of five things, one in each corner and one in the centre of a square or oblong space, as in playing-cards or dice. The term is applied to trees arranged in an orchard so that those in one row face the spaces between those in the neighbouring row; also to a reliquary, the four outer parts of which, two on each side, close over the central part. In the fighting formation of the Roman legion the maniples are said to have been arranged in quincunx order.

Quincy. City and river port of Illinois, U.S.A., the co. seat of Adams co. It stands opposite the state of Missouri on the Mississippi river, here spanned by a fine rly. bridge, 265 m. S.W. of Chicago, and gives its name to the Chicago, Burlington, and Quincy rly. Manufactures include stoves, pumps, boots and shoes, machinery, and show cases. Settled in 1821, Quincy was incorporated in 1834, and received a city charter in 1839. In the steamboat era it was a focal point in river traffic and the second city of Illinois. Pop. 40,469.

Quincy. City of Massachusetts, U.S.A., in Norfolk co. It is situated 8 m. S.E. of Boston and $1\frac{1}{2}$ m. from the sea, on the New York, New Haven, and Hartford rly. Quincy granite is exported in large quantities; the horse-rly. made 1826-27 to transport the granite for the Bunker Hill monument was the first rly. in the U.S.A. The city manufactures boots and shoes, soaps and chemicals, has a boatyard, and contains the Adams Academy and the Woodward Institute. It owes much to immigrants who entered quarries and shipyards in the 19th century. The old Quincy House, a fine specimen of colonial architecture, is a museum of Colonial and Revolutionary antiquities. John Hancock, John Adams, and his son John Quincy Adams were natives. Settled in 1625 as Mt. Wollaston, and one of the oldest inhabited places in the state, Quincy took its present name in 1792 and became a city in 1888. Population 75,810.

Quinet, EDGAR (1803-75). French author, born Feb. 17, 1803, at Bourg-en-Bresse. After extensive travels he was appointed professor in Lyons university 1839, and in the Collège de France, 1841. An active Radical in politics, he was exiled after the *coup d'état*, 1851, but returned to



Quimperlé, Brittany. Rue des Ecoles and the church of S. Michel

France on the fall of the empire. As an historian he is romantic in style but philosophic in purpose, seeking, as in his *Révolutions d'Italie* (1848) and *La Révolution* (1872), the inner significance of the facts presented. His other writings include a mystical treatise, *Du Génie des Religions*, 1842; *Ahasvérus*, a kind of allegorical miracle-play on the Wandering Jew; and the allegorical prose-epics, *Prométhée* and *Merlin l'Enchanteur*. He died at Versailles, March 27, 1875. *Consult* Life, R. Heath, 1881.

Quinine. Chief alkaloid present in the bark of the cinchona (*q.v.*) tree. Isolated in 1820 by Pelletier and Caventon, quinine is a whitish, micro-crystalline, odourless substance possessing a bitter taste which is intense and persistent. It forms a large number of salts, those most commonly used being the sulphate, bisulphate, hydrochloride, and dihydrochloride. Quinine has a well-established reputation in the treatment of malarial fevers, but the mechanism of its action is still uncertain. It is sometimes used to stimulate the gastric and salivary secretions in various forms of indigestion, and has an antipyretic action similar to that of aspirin and phenacetin. It is used as a sclerosing agent in the treatment of varicose veins. Excessive doses produce ringing in the ears, deafness, defects of vision, headache, and nausea. *Consult* The Fever Bark Tree, Duran-Reynals, 1847.

Quinoa (*Chenopodium quinoa*). Herb of the family Chenopodiaceae. It is a native of the Pacific slopes

for these seeds, which are boiled to furnish a gruel. Sometimes they are roasted before boiling.

Quinoline. Organic base originally prepared by distilling quinine with caustic potash. It also exists in coal-tar. It is a colourless, oily liquid with a faint aromatic odour recalling peppermint oil. Quinoline is made synthetically by heating a mixture of glycerin, aniline, nitrobenzene, and sulphuric acid.

Quinone, or BENZOQUINONE. Organic compound ($C_6H_4O_2$), first prepared by oxidising quinic acid, but now made by oxidising aniline with potassium dichromate and sulphuric acid. Quinone crystallises in golden-yellow prisms which readily sublime, emitting an acrid smell. The discovery that vitamin K is a naphthaquinone derivative has created new interest in the medicinal possibilities of quinone.

Quinquagesima (Lat. *quinquagesimus*, fiftieth). Term applied to the next Sunday before Lent. Quinquagesima Sunday falls 50 days before Easter, both inclusive. It was known as Shrove Sunday.

Quinquennial (Lat. *quinque*, five; *annus*, year). Something occurring every five years. It is also used for a period of five years, which is more correctly a quinquennium. A quinquennial valuation is a re-valuation of property, to assess it for rates, that takes place every five years.

Quinquereme (Lat. *quinque*, five; *remus*, oar). War vessel used in ancient times. The name is due to the fact that it had five banks of oars, one on top of the other. *See* Trireme.

Quinsy (late Lat. *quinsia*, from Gr. *kyōn*, dog; *anakein*, to throttle). Acute inflammation of the tonsil, accompanied by abscess formation. The use of the sulphadiazine and penicillin have made it less common and less menacing. *See* Tonsil.

Quintain. Instrument used during the age of chivalry in practising the art of tilting with the lance. Originally a stout post, it was developed into a device for discomfiting the unskilled man-at-arms. The humbler classes practised a similar variety of exercise, the target being so poised as to swing round and, unless skilfully evaded, deal a sharp blow from a sandbag hung from the other end of the crossbeam. This latter form

of the sport was a popular country amusement as late as the 18th century. The word is from Lat.

quintana, the part of a Roman camp devoted to military exercises.

Quintal. Measure of weight used in Spain, Portugal, and other countries. In Spain it is 100 libras, or 101.4 lb., in Portugal 58.752 kilogrammes or 129½ lb.

The weight is also used in S. America. The metrical quintal equals 100 kilogrammes or nearly 2 cwt.

Quintana, JOSÉ MANUEL (1772-1857). Spanish writer and politician. Born at Madrid, April



José M. Quintana
Spanish writer

11, 1772, and educated at Salamanca, he became an advanced republican, expressing his views in his *Lives of Celebrated Spaniards*, 1807-34, and in his poetry.

His advanced political views involved imprisonment for several years. Restored to favour in 1820, he was made a senator, and died March 11, 1857. He wrote plays, as well as a biography of Pizarro.

Quintana Roo. Federal territory of Mexico. Organized in 1902, it is situated in the Yucatan peninsula, and is bounded E. by the Caribbean Sea. It covers 19,438 sq. m. The capital is Chetumal. Pop., territory, 18,752.

Quintero. Name of two brothers, Spanish dramatists. Serafin Alvarez (1871-1938) was born at Utrera, Seville, and in collaboration with his brother Joaquín Alvarez (1873-1944) wrote over 200 works for the stage—dramas, comedies, farces, sketches. Best known in England and the U.S.A. are *The Lady from Alfaceque*. The Romantic Young Lady, *Don Abel Wrote a Tragedy*, and *A Hundred Years Old*. The brothers' plays, though sometimes lacking force, give a truthful, humorously sentimental picture of Spanish provincial life. A Hundred Years Old was produced at the Lyric Theatre, Hammersmith, 1928. Several of the comedies were translated by Helen and Harley Granville Barker. Serafin died April 13, 1938; Joaquín, June 14, 1944.

Quintet (Lat. *quinque*, five). Musical composition for five performers. The most celebrated



Quinoa Foliage and flower clusters:
inset, fruit

of the Andes. It attains a height of 5 ft., with a stout, furrowed stem and somewhat triangular-oval leaves with sinuate margins. The small green, clustered flowers are succeeded by small fruits, each containing a single round, flattened seed. The plant is cultivated

example for singers is in *The Mastersingers* by Wagner. The string quintet has never attracted composers as much as the quartet, but the addition of another instrument to four strings has resulted in fine works, among which may be mentioned the piano quintets of Schumann (op. 44) and Dvorak (op. 81) and the clarinet quintet of Brahms (op. 115).

Quintilian (c. A.D. 35-97). Roman rhetorician. His full name was Marcus Fabius Quintilianus. Born at Calagurris in Spain, he was educated at Rome, and returned to Spain as a teacher of oratory. His great work in 12 books, *The Institutes of Oratory*, represents the fruit of some 20 years' experience as professor of rhetoric and practical pleader in the law courts.

Grave Quintilian, as Pope called him, possessed a fine sense of literary criticism, and his appreciations of the leading Latin and Greek authors are of great interest. The final book, on education, is also of permanent importance. The broad and sane views which the author expresses on this subject anticipate some modern theories.

Quintuplets. Five infants born at one birth. The most famous modern example is the five daughters, Yvonne, Annette, Cécile, Émilie, and Marie, born to Mr. and Mrs. Olivia Dionne at Callander, Ontario, Canada, May 28, 1934. They were born in the log farmhouse of their parents in the space of 30 minutes, and were delivered by Dr. A. R. Dafoe (1883-1943), a local practitioner. Their aggregate weight at birth was 12 lb. 2½ oz.; the heaviest being Yvonne, 2 lb. 6½ oz., and the lightest Marie, 1 lb. 10 oz. They gained in weight rapidly and at the age of ten averaged 78 lb. By an Act of the Ontario legislature they became wards of the crown, their four guardians including their father.

This crown guardianship ceased with their 10th birthday, except financially. At that time they had contracts (mainly in advertising) yielding an annual income of \$30,000, and a reserve fund of \$1,000,000, held in trust until their 21st birthday. After they were ten, they lived with their parents and were educated at home by three nuns.

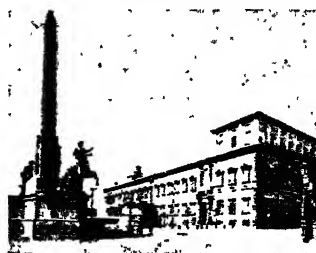
Quipu. Ancient Peruvian device of knotted strings for keeping records. From a stout cord depended a fringe of threads of different colours, sometimes with wood or stone pendants. The arrangement of knots and the order of the threads served to record

the results of the hunts, the number and composition of the llama herds, details of tribute, and matters connected with peace and war.

Quire. Measure of paper, the twentieth part of a ream, i.e. 24 sheets. The term is used also for small books or pamphlets which contain a quire of paper. A newspaper quire contains 27 copies, a printer's quire 25 sheets. The word was formerly used for four sheets of paper or parchment folded to make eight pages of a book.

Quirigua. Town of Guatemala, 110 m. N.E. of Guatemala city. Here the United Fruit Company maintains a model hospital. Near by are remains of a Mayan temple and carved monoliths. It is connected with Puerto Barrios (80 m.) by rly. Pop. approx. 4,000.

Quirinal (Lat. *Collis Quirinalis*). One of the seven hills on which Rome is built, 170 ft. in



Quirinal, Rome. Royal palace and, left, fountain and obelisk

height. Situate in the N.E. quarter, it was early seized by Sabines, and the name was popularly connected with Cures, an ancient Sabine town. The modern palace erected on the summit was founded by Gregory III in 1574; since 1870 it has been a royal palace. See *Quirites*; Rome.

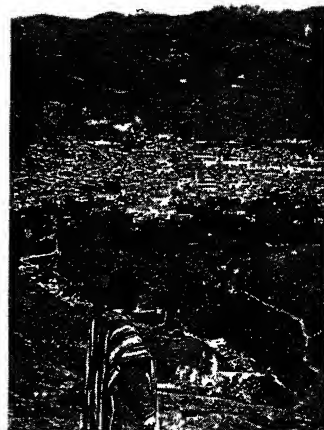
Quirites. In Roman history, originally the Sabine inhabitants of the Quirinal. After the union of Sabines and Romans the name was applied to the individual old citizens, all of whom bore arms; collectively, to all the citizens of Rome. Later, the term was used for civilians as opposed to soldiers, to whom it was a reproach to be called Quirites. The word has been derived from Lat. *quiris* (Sabine, *curis*, a lance), or from Cures, a Sabine town. See Rome; Sabines. *Pron.* Kwiri-teez.

Quirk. Term applied in architecture to the groove or channel which separates the convex part of a moulding (*q.v.*) from the fillet that covers it.

Quisling, LAURITZ VIDKUN ABRAHAM (1887-1945). Norwegian politician. He was born at Fyres-

dal, July 18, 1887, studied at the Norwegian royal military academy, and graduated in 1911. He worked for Nansen, 1924-26, and for the League of Nations on the repatriation of Armenian refugees, then living chiefly in Moscow. On returning to Norway in 1929 he entered politics, a fanatical anti-Communist. In 1931 he became minister of defence, and later founded the Nasjonal Samling, a fascist party. After the German invasion, 1940, Quisling proclaimed himself prime minister, but since he had no political following the Germans dismissed his government. He obtained Hitler's personal support, and his party was made the state party, Quisling being appointed minister president—a puppet dictator—in 1942. With the German collapse in 1945, he surrendered to the Norwegian "home front" and after undergoing trial at Oslo was found guilty of treason, Sept. 10, and executed Oct. 24. He gave a new word to the languages of the world, his surname being adopted as the synonym for traitor.

Quito. City of Ecuador, capital of the prov. of Pichincha and of the republic. Picturesquely placed amid lofty volcanic peaks, at an alt. of 9,350 ft., it is 164 m. direct and 297 m. by rly. N.N.E. of Guayaquil, and lies just below the equator. Owing to its geographical position the temperature varies little, and day and night are always almost equal in length. The seat of the archbishop of Ecuador, it has a cathedral, presidential and archiepiscopal palaces, a mint, monasteries, university, etc. Manufactures include saddlery, ponchos, carpets, cotton and woollen



Quito, Ecuador. The picturesque setting of this Andean capital

goods, jewelry, and articles of Mexican "onyx." Hides and rubber are exported, and a large trade is carried on in oil paintings of religious subjects. Quito was an Indian capital before its capture by the Incas in 1470 and the Spaniards in 1534. The ancient road to Cuzco, built by the Incas, can still be traced. The city has suffered repeatedly from earthquakes and in the civil wars. Fifteen lives were lost and the local radio station burned down in riots in 1949 following a broadcast of Wells's War of the Worlds. Pop. 174,354. *Pron.* Kee-to.

Quit Rent (Lat. *quietus*, free, at rest). Rent by which a tenant secured release from all other services. Under feudal law the lord of the manor had some tenants who held by copy of court roll (copyholders) who were bound, in return for the land, to perform certain services so many days in the year, e.g. to plough the lord's land. With time it became customary for a money rent to be paid instead. When copyhold was abolished by the Law of Property Act, 1922, provision was made for extinguishing the surviving quit rents. *See* Copyhold; Manor.

Quoad Sacra (Lat., sacred thus far). Term used in Scottish local government. It describes parishes that are such for ecclesiastical purposes only, being thus different from civil parishes.

Quodlibet (Lat., what pleases you). Old musical term for the simultaneous performance of a number of different melodies, either prepared and modified so as to fit together, or more commonly sung extemporaneously for fun. The quodlibet, popular in the 16th and 17th centuries, was a favourite pastime of the Bachs.

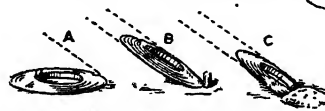
Quoich. Loch or lake in the S.W. of Inverness-shire, Scotland. It is 6 m. long by $\frac{3}{4}$ m. broad. It receives the river Quoich (8 m. long) from the W., and is drained E. to Loch Garry by the river Garry. The head of this river is regarded as the wettest spot in Britain.

Quoin (Fr. *coin*, corner, wedge). In architecture, the stone block employed at the external corners of a building to emphasise its solidity and strength. A "rustic" quoin is roughened and raised above the general wall surface, so as to accentuate the differences between the former and the latter. The external angles of a building, whether of stone or brick, are also termed quoins. Blocked quoins are projecting blocks of brickwork, extending over several courses in

depth, used to give an effect resembling that of masonry quoins in a stone building. The word is also applied to the wedge used for tightening or locking up forms in printing. *See* Forme; Masonry.

Quoit. Weapon formerly used by certain tribes in India. It was a circular disk with a sharpened outer edge, and was thrown or skimmed along the ground against charging cavalry.

Quoits. Pastime which probably had its origin in England and Scotland in the 15th century. At the present day the game is played in Scotland, principally by mem-



Quoits. The diagrams show, A, a ringed quoit; B, a cutter; C, a quoit pitched true, and how the quoit should be held

bers of the various curling clubs, and in England by the workmen of Lancashire and the Midlands; also in the U.S.A. and Canada.

The playing area is formed of two beds of clay, each 3 ft. in diameter and generally situated 18 yds. apart from centre to centre. Into each centre is driven an iron pin, termed the hob, of which an inch remains exposed above the level of the ground. The quoit is a flattened ring of iron, thick at its inner and thin at its outer edge, not exceeding 8 ins. in diameter and usually weighing about 9 lb.

The object of the game is for the player, who stands at one end just outside the clay bed and in a line with the pin, to cast his quoit so that it falls over the pin at the far end—termed scoring a ringer—or as near to it as possible. Each player throws two quoits in succession, a ringer scoring two. Should neither player throw a ringer, the player whose quoits are nearest to the pin scores two; if only one of his quoits is nearest it counts one. If the two nearest quoits are at the same distance from the pin and belong to different players, neither scores. The players then throw to the other end, continuing until one of them has scored the number of points agreed upon for game.

Matches are played between single players or two on each side. All quoits which alight on their backs are foul, and in important matches it is usual to reckon all quoits as foul which are more than 18 ins. from the pin.

Quorn. Premier English hunt. The name is taken from Quorndon

in Leicestershire. The country hunted is regarded as the best for that sport in England. It is about 20 m. by 20 m. in area, Loughborough being roughly its centre, although Melton Mowbray is more frequented as such. The kennels are near Barrow-on-Soar, and the hounds are the property of members. The country is said to have been hunted in the latter part of the 17th century by Thomas Boothby with the first pack of foxhounds in England, but the pack was not definitely established until the 18th century under the master-ship of Hugo Meynell. Its masters have included Squire Osbaldeston, Assheton Smith, and the earl of Lonsdale. *See* Fox-hunting.

Quorra OR **KWARA.** Native name applied to the navigable section of the Niger river which flows through the Hausa country in the N.W. of Nigeria.

Quorum (Lat., of whom, or of which). Term used for the minimum number of persons necessary to form a meeting, at which the business of a company, club, or other association is transacted. Of public companies the articles of association usually declare what is the number of directors necessary to form a quorum, and in societies and associations it is laid down by rules or by-laws. In the British house of commons the quorum is forty, and in the house of lords thirty.

There is no general law on the subject of a quorum, but a proviso of this kind is necessary to prevent a mere handful of persons from binding the whole body by their action. In both chambers of congress of the U.S.A. and of the French parliament the quorum is a majority of the members of each house. The word was originally used in this sense in the commission appointing justices of the peace in England, and its later uses are derived therefrom.

Quota (Lat. *quotus*, how great?). In law, the proportion of a contribution, generally the proportion of a tax or levy by the crown. In England it was used for the number of men which the different towns and districts were expected to contribute to the armed forces, and also for the amount levied on the various localities on account of the land tax (*q.v.*). It is also used for the number of votes necessary

to secure election under a system of proportional representation (*q.v.*). The term is further used in matters political, economic, and social, when a total quantity has to be distributed among different nations or certain groups within a nation. Thus, in 1921 the U.S.A. fixed a quota of prospective immigrants, and from time to time varied the number admissible from individual countries. In 1931 France established a quota for the import of certain commodities, and later subdivided the total quantity to decide the quota of imports from various countries. Great Britain adopted a similar plan. Quotas were a usual feature of agreements entered into by the German Nazis with other countries. In 1948 import quotas for different classes of goods were enforced by most countries as a means of controlling foreign exchange and avoiding too large an excess of imports over exports. The draft charter of the international trade organization of U.N.O., speaking generally, prohibits import and export quotas and licensing systems, except in imports of agricultural produce and fish, or to safeguard the country's monetary reserves.

Production quotas were part of producers' restriction scheme in, *e.g.*, rubber (1922-28), sugar (1931-35), American cotton, Brazilian coffee. Sales quotas are part of the normal organization of cartels; but the temptation to the individual producer to break his agreement is one source of weakness in such combines, particularly when they are international in scope. The Cinematograph Films Acts, 1938 and 1948, established exhibitors' quotas, *i.e.* ratios between British and foreign films to be included in programmes. During the post-war shortage of steel, timber, paper, etc., individual users were allocated a quota or maximum share dependent to some extent on their pre-war consumption. In 1948 quotas were operated to control admittance of students to the universities.

Quotation. Passage extracted from the speech or writing of another. When the words are repeated exactly, or prefaced by a phrase like "as A. B. says," it is usual to put them within quotation marks, or to use some alternative device for distinguishing them, *e.g.* smaller type. But a wider class of quotations covers those phrases with which the user assumes his readers or hearers to be familiar. From whole passages in

Shakespeare or Pope every phrase has been borrowed so often as to become part of the language; despite alteration to its parts of speech or tenses, it is still recognizable. To say, "I felt like a fool rushing in," will not disguise the allusion to Pope's line, "For fools rush in where angels fear to tread." This is not the same as a misquotation, by which through ignorance or laziness a wrong word is admitted. In the last line of Milton's *Lycidas*, "fresh woods and pastures new" is almost universally misquoted as "fresh fields"; while one of Burns's finest lyrics is rendered nonsense by people who sing, "for the sake of auld lang syne," instead of "for auld lang syne."

The justification for quoting is that a phrase becomes quotable only because it deserves to; it sums up an idea or feeling in words more effective than any the borrower could invent for himself at the moment; by its universal quality a man can establish relationship with reader or hearer, referring him to a common experience—"what oft was felt, but ne'er so well expressed." "I quote others," declared Montaigne, "to express myself the better." A. S. M. Hutchinson, with *If Winter Comes*, 1921, started a vogue for quotations as titles for books and plays. The dangers of quoting are that language may be strained to fit the quotation; a phrase may be staled or blunted by repetition; the use of obscurer quotations, which does avoid this, may annoy the less widely educated.

Among numerous encyclopedias of quotations may be cited Riley's *Dictionary of Classical Quotations*; Cassell's *Classified Quotations*, ed. W. G. Benham; Bartlett's *Familiar Quotations*; Stevenson's *Book of Quotations*; The *Oxford Dictionary of Quotations* (ed. Bernard Darwin).

Quotation. The inclusion of a security in the stock exchange official daily list. This is published daily by the stock exchange, London, and contains details of the previous day's dealings. The securities quoted may be units of government and municipal loans, the stock of public bodies, or the shares or stock or debentures of public companies. The council of the stock exchange orders the quotation to be made, but imposes stringent conditions before a quotation is granted. Many securities are dealt with on the stock exchange, although no official quotation has been granted for them. Dealings in these "un-

quoted securities" are given in a supplementary list. It does not follow that an unquoted security is less respectable or trustworthy than a security for which a quotation has been obtained; but it may not be so readily marketable.

Quotidian Fever. Form of malaria in which there are recurring paroxysms every day (*Lat. quotidie*).

Quo Vadis (*Lat.*, Whither goest thou?). Title of a novel by the Polish writer Henryk Sienkiewicz (*q.v.*). It deals with the persecutions of the early Christians in Rome under Nero, and published in 1895, was first translated into English in 1896. It has been rendered into all the principal languages of the world. A dramatized version was produced at the Adelphi Theatre, London, in 1900, and an elaborate silent film of the story was made in Italy in 1912.

Quo Warranto (*Lat.*, by what warrant?). Writ of inquiry instituted in England by Edward I in 1278. The king had been seriously injured by encroachment on his royal privileges, and so he appointed commissions to examine the warrants by which various barons and corporations owned land and exercised jurisdiction. If the title was found defective the land could be recovered for the crown. It was when interrogated under one of them that Earl Warrenne threw down an old sword, telling the king's men that by that sword his ancestors had won his lands, and by the same sword he would keep them.

In modern times there was an information in the nature of a quo warranto by which a person who claimed to hold an office could be required to prove his right to it, or a body claiming to be a corporation could be asked to justify its claim. The procedure was abolished as to local authorities in 1933, and all informations of this nature were swept away in 1938. The procedure now against a person claiming to hold an office is by way of injunction; and no order will be made if he has acted in the office for the previous six years.

Qurna, EL, OR KURNA. Town of Iraq. It stands on the Tigris, 45 m. N.W. of Basra. Of strategic importance, it is built on an ancient site, though at the time of the Assyrian and Babylonian empires it was probably submerged under the headwaters of the Persian Gulf. In the district is the traditional site of the Garden of Eden. The town was occupied by British troops in 1915.

THE letter R is commonly accepted as descending directly from the Egyptian hieroglyph of the 5th cent. B.C., representing a mouth. The later cursive form (hieratic) of this was and this reappeared in the Hebrew and Phoenician inscribed alphabets thus :



◁, to which figure was given the name *resh*, head, from its pictorial suggestion of a human head and neck.

As with the precursors of other letters, e.g. B, C, E, K, the early Greeks began to reverse the *resh*: Ϻ, sometimes adding a short tail: ϻ. Thus the classic Greek form, the *rho*, a ϱ rounded version of the revised *resh*, exactly resembled

our letter P. But the Roman P was developed from the Greek *pi* (see P). Taking over the *rho*, the Romans therefore found it necessary to reintroduce the tail, but the classic Roman alphabet added length and dignity to that tail to produce the letter in its familiar form.

The changes in the minuscule are more subtle. The cursive pen form gradually eliminated the loop, running loop and tail into one vague stroke. One 7th century form was ϱ, which may be seen as the parent of a form ϱ commonly used in informal writing today. A development of this in later MSS. was ϱ, forming a link between the 7th century form and the r of modern typography.

R Eighteenth letter of the English and Latin alphabets, one of the two liquid consonants, *l* being the other. Its normal sound is that in *rat*, *road*, and softer in *lord*. In England it is usually almost inaudible at the end of words, unless a vowel follows; in *a good mother* the *r* is almost inaudible, but in *the mother of three* it is distinctly heard. The "intrusive *r*" is similarly but wrongly introduced in, e.g., "the India Roffice." In Scotland *r* is generally more strongly stressed. In words like *centre* the position of *r* and *e* is reversed as in *-le*, *centre* being pronounced, and in the U.S.A. generally written, *center*. *R* exercises a distinct influence on the sound of the vowels; it changes short *a* into the long Italian *a*, e.g. *can*, *car*, and short *o* into broad *o* or *aw*, as in *not*, *nor*. *R* is mute in *worsted* (yarn), but is audible in *worsted* (defeated). See Alphabet; Phonetics.

R.34. British airship. Launched in 1919, it had a gas capacity of nearly 2,000,000 cub. ft., was 643 ft. long, and had a maximum diameter of 79 ft. It was fitted with five Sunbeam aero engines, each of 250 h.p. In the year of launching it flew the Atlantic in each direction, the first airship to do so. In Jan., 1921, the airship met with disaster, colliding with a hill in Yorkshire, and, though reaching the Howden aerodrome, became a total wreck. See Airship and illus., p. 227.

R.38. British airship. When built in 1921, it was the biggest airship in the world, with a gas capacity of over 2,700,000 cub. ft., a length of 700 ft., and a maximum diameter of 85 ft. Intended for service with the U.S. navy, the R.38, which had six Sunbeam engines each of 350 h.p., buckled and broke in two during turning trials over the Humber, Aug. 24. Only five out of the company of 49 were saved.

R.101. British airship. Built in 1929, it had a gas capacity of over 5,000,000 cub. ft., a length of 724 ft. (later increased by a further 45 ft. by the addition of an extra bay), and a maximum diam. of 132 ft. On Oct. 5, 1930, on its first flight, bound for India, it was wrecked near Beauvais, France, only six of the 54 persons on board escaping when it burst into flames; victims included Lord Thomson, secretary of state for Air, and Sir Sefton

Horus of Edfu, he became hawk-headed, with sun-disk and uraeus (serpent head-dress). From the Vth dynasty every king bore a Ra-name. See Amen-Ra; Egypt.

Raab, or **RABA**. River of Hungary. Rising in the E. Alps in Styria, it flows for 160 m. along a curved course through Hungary to join the Little Danube at Győr. Raab was also the German name for the city of Győr (*q.v.*).

Raabe, **WILHELM** (1831-1910). German novelist. Born at Eschers-



R.101. After the disaster near Beauvais, France, October 5, 1930, when 48 persons, out of the 54 aboard, lost their lives. The airship was on her maiden voyage from Cardington, Beds, bound for India

Brancker, designer of the ship. It had five engines of 480 h.p. Its sister ship, the R.100, which had crossed the Atlantic in 1930, was dismantled in 1931, following the R.101 disaster. See Airship and illus., p. 227.

Ra or **Rē**. Egyptian Sun-god. Represented as a solar disk traversing the sky in a bark, incense was offered to him at dawn, noon, and sunset. At Heliopolis his principal temple was erected in the XIIth dynasty. Assimilated to

hausen, Sept. 8, 1831, he made a success in 1857, with *Die Chronik der Sperlingsgasse*, which, as did all his works, appeared under the *nom de plume* of Jakob Corvinus. His characters were largely drawn from the country folk of Brunswick, and were delineated with pathos and humour. His principal novels were *Der Hungerpastor*, 1864; *Abu Telfan*, 1868; *Prinzessen Fisch*, 1883; *Hastenbeck*, 1899; *Altershausen*, 1911. He died at Brunswick, Nov. 15, 1910.

Consult Works, 4 vols., 1896-1900; *Lives*, P. Gerber, 1897; W. Brandes, 1901.

Raasay. Island of the Inner Hebrides, Inverness-shire, Scotland. It is separated from the Isle of Skye by the Sound of Raasay. The surface is generally hilly in the S. and barren towards the N. On the E. coast are the ruins of Brochel Castle, a stronghold of the Macleods. The length of Raasay is 12 m.; breadth from 1 to 3 m.

Rab. This Yugoslav island of the Adriatic is described under its Italian name Arbe.

Rabah Zobeir (c. 1846-1900). African chieftain. Of mixed Arab and negro blood, he was born a slave, but rose to the command of Zobeir pasha's slave-raiding forces in Bahr-el-Ghazal. Defeated by the khedive, 1879, he fled to Central Africa, where he carried out slave raids and depredations. Seizing 300 rifles from the baggage of a murdered French explorer, Paul Crampel, in 1893, he deposed the sultan of Bornu (Lake Chad), and in 1897 attacked the sultan of Bagirmi, driving him and the French resident from the country. A French punitive expedition was dispatched in 1899, and after three battles, routed his forces and slew Rabah, April 22, 1900.

Rabat. Seaport and capital of French Morocco. It stands on the Atlantic coast at the mouth of the river Ragreb, opposite Sallee or Sali, and was once the chief port for European commerce. It is connected by rly. with Fez (q.v.) and Casablanca (q.v.). Olive oil, wool, skins, bones, and wheat are exported; carpets and textiles are manufactured. Here the sultan of Morocco and the French administration have their headquarters. There are law courts and schools for higher education. When the Allies invaded N. Africa in the Second Great War, Rabat was occupied by U.S. troops on Nov. 11, 1942, after Admiral Michelier had requested an armistice. The port became a centre for supplies and reinforcements to the Allied troops. Pop. 148,000.

Rabaul. Former seaport on the N.E. coast of New Britain, Pacific Ocean. Until the Second Great War it was the administrative centre of that part of New Guinea under Australian mandate. It is 14 m. N.W. of Kokopo, the designated new capital of the island. Destroyed by volcanic eruption on May 31, 1937, it was being rebuilt and had an anchorage and wharf, with regular steamship services to Australia, and fine public gardens.

On Jan. 4, 1942, Rabaul was first attacked by waves of Japanese bombers. Troops landing on the 23rd met with bitter opposition from the garrison, but the town was in Japanese hands by the end of Jan. As one of their aircraft and supply bases it was repeatedly bombed by the R.A.A.F., especially early in 1944, when huge supply dumps and underground fortifications had been installed. The capitulation of Japanese forces in the S.W. Pacific was received by Lieut.-Gen. Sturdee, Australian 1st army, off Rabaul, Sept. 9, 1945. War damage to the town was so great that it was not rebuilt.

Rabba. Town of Northern Nigeria. On the left bank of the Niger, it is about 200 m. above the confluence of the Niger and Benue rivers, and a few m. below Jebba. When visited by Richard Lander in 1830, it was a place of importance as a commercial and slave market with 40,000 inhabitants, but it has now only a small population.

Rabbah or **RABBATH.** Chief city of the Ammonites (q.v.). Situated in the mts. of Gilead, it has been identified with the modern Amman. Here Uriah the Hittite, set in the forefront of battle during the siege of the place, lost his life. At Rabbah Conder found a huge stone throne which he thought to be the "bedstead" of Og, king of Bashan. The city is the subject of denunciation in several O.T. prophecies (Deut. 3, v. 11; 2 Sam. 11, v. 17; Jer. 49, vv. 1-3; Ezek. 21, v. 20, 25, v. 5).

Rabbeth, SAMUEL (1857-84). British medical man, who took his degree at King's College, London. In 1884, when working at the Royal Free Hospital, London, to save the life of a child suffering from diphtheria he sucked the throat, and, taking the infection, died Oct. 20, 1884. This heroism is commemorated by cots at the hospitals and by a scholarship at King's College.

Rabbi (Hebrew, my master). Jewish title for a teacher (Matt. 23, v. 7). The term is now commonly applied to any member of the Jewish clergy. Christ was addressed as Rabbi (John 1, 3, and 6). Among Jewish scholars Judah, the editor of the Mishnah, is known as the *r a b b i*. See Jews.



Rabbi in ecclesiastical robes

Rabbit (*Oryctolagus cuniculus*). Animal belonging to the order Rodentia, or gnawing mammals. With the hare it is set apart from the rest of the rodents by the presence of an additional pair of incisor teeth in the upper jaw.

The rabbit is distinguished from the hare (*Lepus*) by its smaller size, shorter ears, legs, and feet, and grey colour. There are also differences in the relative length of the bones of the legs and in the habits of the two animals. Whereas hares are solitary, and crouch in furrows or in hollows under herb-
age, rabbits are gregarious and live in burrows. They are also much less fleet of foot.

The origin of the rabbit has been the subject of much debate, and is still very obscure. Its remains do not occur in prehistoric encampments, and the fact that its bones have been found in cave deposits with those of extinct animals proves nothing, as the burrowing habits of the animal may account for it. There is no record of its introduction to the British Isles. It has been assumed, but without any proof, to have been brought by the Romans. At any rate, it was common in England in the 12th century, but in the Highlands of Scotland it was unknown a hundred years ago.

The rabbit is a nocturnal animal, feeding in the late evening and early morning; but in quiet spots it may be seen about at all hours of the day. Owing to its large numbers, it is a most destructive creature in plantations and gardens. Its fur is made into cheap imitations of better kinds, and is felted for the production of hats.

As the rabbit often has four or five litters in the year, and the young ones are ready to breed at six months old, it multiplies at a prodigious rate if not kept down. One pair under favourable circumstances could have a progeny of over 13 millions in three years. In Australia the introduction of this rodent has resulted in a most serious menace to agriculture.

The rabbit is largely kept in captivity, as a pet and for commercial purposes, and its domestication has brought about many changes in size, colour, and form. One of the most curious is a modification of the skull, which causes the ears to droop instead of standing erect. The large "double-lop" is a favourite breed with the fancier.

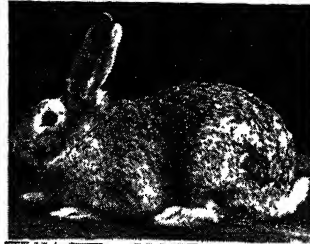
The so-called Belgian hare, which is really a modified rabbit, attains a large size, and is normally imported in large numbers to Great

Britain for consumption as food. The Angora is known by its long, woolly fur and the Himalayan is a colour variety produced by crossing a silver-grey and a chinchilla. The Dutch fancy rabbit is noted for its small size.

RABBIT FARMING. The flesh and pelt of the rabbit are both of value, and the considerable demand in Great Britain has been largely met by importation, chiefly from Australasia. There is ample scope in the U.K. for controlled production of rabbits, either in properly managed warrens or on rabbit farms. In warrens most of the animals must be killed off before the end of the year, restocking in January or February; this enables the ground to get clean. Tame rabbits should not be introduced into the warren. Hay is used in racks for winter feeding, and can be supplemented by a small amount of maize. Turnips should be avoided.

RABBIT SHOOTING. Under the Ground Game Act the tenant farmer may shoot rabbits on his farm, although the sporting rights are reserved to the landlord. The two modes of shooting rabbits are by a special battue or taking them as a chance variety of ground game when out pheasant and partridge shooting. Beating for rabbits in covers should be accomplished by the beaters poking them out: a rabbit will run from the least prod with a stick but if struck may be beaten to death before it will run. It is practically impossible to drive them up-wind to guns, their sense of smell being so remarkably keen. In getting rabbits out into the open for shooting, the openings of their burrows should be plentifully besprinkled with gas-tar daily for three or four days previous to the shoot, when, owing to their dislike of the smell of the gas-tar, they will vacate their burrows and lie out in the adjacent fields. Another method widely used is to employ ferrets to drive the rabbits from their burrows.

Rabelais, François (c. 1490–c. 1553). French author. Born at Chinon in Touraine, where his father was an apothecary, he was educated for the Church, and about 1509 entered the Franciscan monastery of Fontenay-le-Comte in Poitou. But here his enthusiasm for humanistic studies aroused the hostility of his superiors, and in



Rabbit. Types of familiar breeds. Top, common wild rabbit (left) and white-furred breed. Beneath those (reading downwards): Chinchilla rabbit, silver rabbit, Angora rabbit

1524 he obtained permission to transfer himself to the less austere order of Benedictines, in which he remained till 1530, when he abjured the ascetic life altogether. His Greek text of the Aphorisms



François Rabelais, one of the world's greatest satirists
From a painting in the Louvre

of Hippocrates, 1532, was the first to appear since that of Galen in the 2nd century.

Inspired by a passion for science, he then took up the study of medicine, received his doctor's

degree at Montpellier in 1537, lectured, edited a number of medical works, and practised in the hospitals at Lyons. In the meantime Rabelais had visited Italy, in 1534 and 1536, in the suite of Cardinal du Bellay, with whom he again went to Rome in 1549. In 1546–47 he was town physician at Metz, and in 1550–52 curé of Meudon. He removed to Paris in 1553 and died there, it is supposed, shortly after his arrival.

Rabelais' one great work in literature, produced at intervals amid his other avocations, is a series of chronicles narrating the adventures of two mythical giants—*La Vie très horrible et terrible de Gargantua, forming Book I, and Pantagruel, Roy des Dipsodes, avec ses Faicts et Prouesses Espouvantables, Books II–V*; though the authenticity of Book V, which was not published till twelve years after his death, is uncertain. Superficially viewed, these chronicles are nothing but an immense, rambling burlesque: *roman d'aventures*, in which the author's amazing humour runs riot amidst the wildest extravagances and the grossest obscenities. But Rabelais was not only a great humorist; he was also one of the boldest and most progressive thinkers of his time; and he deliberately adopted his farcical machinery as the vehicle of his opinions on many subjects which it was then dangerous to discuss in earnest. Even so, the theologians came to perceive the revolutionary potency of his teaching, with the result that the fourth book was condemned by the Sorbonne and prohibited by the Parlement of Paris.

Modern criticism is probably inclined to read too much system into his philosophy; but its main drift is clear. It rests ultimately upon the heretical belief in the absolute goodness of nature and what is natural, and as this belief involved the principle of freedom for life and thought, it brought him into collision with both the old and the new school of theology. But though he did not spare the Calvinists, his fiercest satire is directed against medieval Catholicism, and especially against its

dogmatic tyranny, the intellectual submissiveness inculcated by it, and its asceticism. Rabelais' work was translated into English by Sir Thomas Urquhart and Pierre Motteux, 1653-94. Sir Thomas Urquhart translated Books I and II in 1653; Book III appeared in 1693, and Books IV-V, by Pierre Motteux, in 1694. This joint version has often been reprinted, notably in the Tudor Translations, 3 vols., 1900. A modern translation, by W. F. Smith, 2 vols., 1893, contains minor writings, letters, and other documents of interest. A monument to Rabelais, in the grounds of the university of Montpellier was unveiled by Millerand, then president of France, in 1921. *Pron.* Rabblay.

Bibliography. Lives, W. Besant, 1885; R. Millet, 1892; A. Tilley, 1907; W. F. Smith, 1918; J. Plattard, 1930; S. Putnam, 1930; J. C. Porcys, 1948.

Rabi, ISIDORE ISAAC (b. 1898). An Austrian-born American physicist. Soon after his birth, July 29, 1898, he went to the U.S.A. with his parents. He served as a private in the U.S. army in the First Great War, and then went to Cornell university. Ph.D. in 1927, he worked for two years as physics tutor in New York, and in 1929 became assistant professor at Columbia university. Promoted to associate professor in 1935, he took the chair of physics in 1937. His main interest was the electrical and magnetic properties of atomic nuclei, as shown by their spectra, and for his work in this field he was awarded the Nobel prize for physics in 1944.

Rabies (Lat. *rabere*, to rave). Disease due to infection by a micro-organism usually conveyed by the bite of a dog. It is generally applied only to the condition as manifested in the dog. When transmitted to human beings it is more often called hydrophobia (*g.v.*). For precautions against epidemics of the disease, see Muzzling Order.

Raby Castle. Seat of Lord Barnard. It is in Durham, 5 m. from Barnard Castle, overlooking the Tees. The original castle was built by a Neville before 1400, but most of the present building is of somewhat later date. One of the finest specimens of a feudal castle in England, it is surrounded by ramparts and a moat, and has a keep, a machicolated gateway, and some massive towers. The baron's hall is the chief feature of its magnificent interior. In the 17th century it was bought by Sir

Henry Vane; it was later the chief seat of his descendants, the dukes of Cleveland, passing to another Vane, Lord Barnard, on the extinction of the dukedom in 1891.

Racahout (Fr.). Farina from the edible acorn of the Barbary oak. It is flavoured, and used in much the same manner as arrowroot. Substitutes may be made with chocolate, sugar, tapioca and potato flour, and vanilla.

Racalmuto. Town of Sicily, in the prov. of Agrigento. It is situated in a hilly district, 13 m. by rly. N.E. of Agrigento, and trades in wine and olive oil. There are mines of quick silver, sulphur, and salt in the vicinity. Population est. 16,000.

Raconigi. Town of Italy, in the prov. of Cuneo. It stands on the river Maira, in a fertile plain, 23 m. by rly. S. of Turin. The royal chateau, built in 1570, but since considerably enlarged and restored, has a fine park laid out in French style. The chief manufactures are connected with silk and woollen goods, and there is trade in local produce. Pop. est. 11,000.

Race (Fr., from Ital. *razza*). Term meaning a group of interbreeding organic beings possessing a large number of characteristics in common. Mankind forms as a whole the human race, having the erect posture, the hand, helpless infancy, paucity of body hair, the large brain, good stereoscopic vision, and a number of other features in common, and descent from ancestors in various regions, these ancestors, like man, ranging widely and intermingling. Language, religion, and political allegiance are not to be used as indications of race, though differences in these matters may form social bars to marriage and so tend to accentuate physical differences in the course of millennia. It is, therefore, incorrect to speak of an Aryan race or a British or a Latin race.

Man is unique in the animal world in that he has contrived to live in all climates except that of the Antarctic continent, and he has drifted from one region to another at several stages in his history of about 600,000 years. Many early drifts were S. of the great Pleistocene ice sheets of the Scandinavian, Alpine, Caucasian, and inner Asiatic heights, into regions with strong ultraviolet radiation where, as a protection against excess of this radiation, the pigment of the skin increased, becoming almost black in certain exposed regions. In cool, cloudy

lands where there is little of this radiation the pigment is reduced to vanishing point; in areas of very cold winters with blue skies the skin is so dense as to be yellowish or yellow brown.

From central Asia peoples with yellow brown skin have drifted to the Arctic, where the brown tint protects them against snow glare, and they have also drifted via Arctic Asia to America. Some, the Redskins of America, have a slight red tint in the yellow brown.

Most early drifts of Old Stone Age men were apparently of very long-headed peoples with strong brows and cheekbones. Later drifts were often, especially S. of the ice sheets, of more moderately long-headed people with less bony faces. Among the mts. of the N. hemisphere between the Pyrenees, Alps, Carpathians, Caucasus, and central Asian ranges spread broad-headed peoples many of whom in central Asia became flat-faced through the sinking in of the nasal chambers. Some of these peoples drifted, probably comparatively late, to America. Pygmy peoples in some African and Malaysian forests are broad-headed.

Of the peoples who spread in the warm regions S. of the Pleistocene ice sheets some, chiefly in Africa, Papua, and Melanesia, had or developed loose skin pores, giving the head hair an irregular growth with the result that the hair is kinky. But the dark skinned people surviving in Indian jungles rarely show this hair form, their hair usually being wavy or curly like that of Europeans. The hair of the Australian aborigines and of the Polynesians is always curly or wavy. The extinct Tasmanian, probably from Melanesia, had kinky hair.

Most of the physical peculiarities noted are specialisations which are irreversible. In modern times white skinned Europeans have spread into Siberia, Australia, New Zealand, S. Africa, and America. In Latin America many of them have mingled with the older populations. W. African peoples taken to the U.S.A., the W. Indies, Guiana, and Brazil as slaves have mingled with the white skinned and other peoples of those regions. Yellow-brown skinned peoples have migrated to Malaysia, Sumatra, Java, Borneo, etc., and also to Madagascar. India has sent emigrants to Burma, E. Africa, and S. Africa. The Polynesian peoples are migrants from S.E. Asia who seem to have voyaged through Melanesia, reach-

ing their present homes six or more centuries ago.

Europe, except the Arctic, has white-skinned, wavy-haired peoples, usually long-headed in S. and W., broad-headed in the centre. Towards the N.W. depigmentation becomes so marked that eyes lack brown colour and so show as grey or blue while hair may be blonde. In N. Africa and S.W. Asia the same characteristics are found as in S. Europe, but with more brown in the skin. India, again, shows the same characters, sometimes with very dark skins. Africa S. of the Sahara and Abyssinia (Ethiopia) has people with dark skins and kinky hair, also very prominent lips and nasal openings that no doubt promote cooling of the body by evaporation. Central, E., and N. Asia, except for the recent immigrants from European Russia, has people with dense yellow skins, or yellow-brown skins, and hair that is coarse and straight growing in hair pores that fit tightly around the hair.

The white-skinned Europeans are often called Caucasians and the yellow or yellow-brown skinned people Mongolians; but it would be wrong to classify the wavy haired Australian aborigines with the people of intertropical Africa because of their dark skins. These Australians are more nearly related to the dark-skinned people of S. India. The so-called Caucasian and Mongolian groups include very long-headed, moderately long-headed, and broad-headed elements which in some countries have mingled inextricably. The people of Africa S. of the Sahara are nearly all long-headed. The people of India include all grades of head breadth, and so do the pre-European peoples of America and Polynesia. The Australian aborigines are the remnant of a very early drift of extreme long-heads.

Racecourse. Ground on which horse races are held. There are three kinds of racecourse, the hurdle-race, the steeplechase, and the flat-race course. The flat-race course, as the name implies, is for races without obstacles. The hurdle-race course must have at least six hurdles, not less than 3 ft. 6 ins. high, in the first mile and a half, and at least one for each additional $\frac{1}{4}$ m. The steeplechase course must have (a) at least 12 fences, excluding hurdles, in the first 2 m. and at least six more in each additional m.; (b) at least one ditch, not less than 6 ft. wide and 2 ft. deep; and (c) a water jump

not less than 12 ft. wide and 2 ft. deep. The distance of flat races varies from 5 furlongs to 2 $\frac{1}{2}$ m., and of hurdle races and steeplechases from 2 m. to a little more than 4 m., except for hurdle races for three-year-olds, which from Sept. 1 to Dec. 31 inclusive may be run over a minimum distance of 1 $\frac{1}{2}$ m.

Among the principal racecourses in the U.K. are those at Epsom, where the Derby Stakes is run, Ascot, Chester, Leicester, Lincoln, Goodwood, Newmarket, Doncaster, Manchester, York, Liverpool (Aintree), Hurst Park, Ayr, and Edinburgh. Aintree is the scene of the Grand National, the most important steeplechase event. Newmarket is the English racing headquarters, the Curragh holding a similar position in Eire. See Derby; Goodwood; Horse-racing; Longchamps; Newmarket, etc.

Raceme (Lat. *racemus*, a cluster of grapes). Botanical term for that form of flower grouping (inflorescence) in which the separate flowers are arranged on short lateral stalks from a central axis. Familiar examples may be found in the bluebell and the barberry. The raceme is a type of what is known as the monopodial inflorescence, in which the main shoot continues to lengthen, whilst giving off side branches in succession, each of the latter terminating in a flower. See Flower; Inflorescence.

Racemic Acid. Organic acid discovered by Kestner in 1822, as a by-product in the manufacture of tartaric acid, with which it is isomeric. Racemic acid can be produced by heating tartaric acid with water for thirty hours, at a temperature of 175°C. It is a crystalline body, less soluble in water than tartaric acid.

Rachel. In the O.T., younger daughter of Laban, sister of Leah, favourite wife of Jacob, and mother of Joseph and Benjamin. With Leah she took Jacob's part in his quarrel with Laban. She died in giving birth to Benjamin. The Jewish captives of Nebuchadnezzar passed her tomb on their way to exile (Gen. 29, 31, 35; 1 Sam. 10; Jer. 31; Matt. 2). Over the traditional tomb of Rachel Moses Montefiore erected a small hut in 1849, and in 1867 Rabbi Zwi Kalischer bought a tract of the surrounding land, which his son presented to the Jewish community at Jerusalem.

Rachel (1821-58). A French actress, whose real name was Elizabeth Félix. Born March 24, 1821, at Mumpf, Switzerland,

the daughter of poor Jewish pedlars, she sang in the streets as a child, being later trained by Étienne Choron.



Rachel,
French actress

She was admitted into the Paris Conservatoire in 1833. She made her début at the Théâtre Français, June 12, 1838, as Camille in Corneille's *Horace*, subsequently playing Roxane, in Racine's *Bajazet*, and (her greatest triumph) *Phèdre*. Rachel

created a sensation in London in 1841 and 1842, and won immense applause all over Europe as a tragic actress of supreme genius. She died of tuberculosis at Cannes, Jan. 3, 1858. *Consult* Lives, J. Janin, 1858; Mrs. A. Kennard, 1885; F. H. Gribble, 1911; J. Agate, 1928. *Pron.* Rashel.

Rachmaninov, SERGEI VASSILEVITCH (1873-1943). Russian composer and pianist. He went from Novgorod, where he was born April 1, 1873, to study at St. Petersburg conservatoire and under Arensky at Moscow. A one-act opera, *Aleko*, won the gold medal for composition in 1892.

Rachmaninov made a success in London, 1899, as conductor and performer of his own music, including the celebrated prelude in C sharp minor. He taught in Moscow from 1903, lived at Dresden, 1906-09, then conducted at Boston, Mass., was engaged for the opera at St. Petersburg in 1912, and after the Revolution escaped to the U.S.A. Thence he made frequent concert tours until his death at Beverly Hills, March 28, 1943.

As to the virtuosity of his playing, there were no two opinions. His standing as composer is harder to judge because of the excessive popularity of some works. Among these is the second piano concerto in C minor, 1901, with the pathos of its extended melodies; though the third concerto in D minor, 1909, is equally attractive and more complex. Rivaling all, the Rhapsody on a theme of Paganini, 1934, was his last big work. His



S. V. Rachmaninov,
Russian composer

symphonies have been overshadowed; the failure of the first drove him to depression from which he was roused by hypnotism. His own favourite works were *The Bells*, for chorus and orchestra, and a *Vesper Mass*. An elegiac trio in memory of Tchaikovsky deserves hearing; and his songs and piano pieces are exquisite. Rachmaninov's memoirs, as told to O. von Riesemann, appeared in 1934; a *Life*, by W. Lyle, in 1939. Benno Moiseiwitsch (*q.v.*) was his outstanding disciple.

Racine. Third city of Wisconsin, U.S.A., the co. seat of Racine co. It lies at the mouth of Root river, on Lake Michigan, 24 m. S. by E. of Milwaukee, on main rlys. It contains Racine and Luther colleges. Highly industrialised and possessing a good harbour, it carries on a large trade in manufactured products—wagons, carriages, motor vehicles, agricultural machinery, boots and shoes, hardware, and tobacco. Racine was settled in 1834, incorporated in 1843, and became a city in 1848. A Czech community was founded c. 1860, several Danes followed, and these account for over half the inhabitants. Pop. 67,195.

Racine, JEAN (1639–99). French dramatist. Early left an orphan, he was brought up by his grandmother, a woman of strong Jansenist leanings, and through her influence was at 16 admitted to the school of Port-Royal, where he devoted himself with ardour to the study of Greek literature. Thence he passed to the Collège d'Harcourt, on leaving which he gave himself up, to the great distress of his Jansenist friends, to worldly society and pursuits. He soon attracted attention by some odes, for one of which, on Louis XIV's marriage, he was given a hundred livres from the royal purse.



Racine
From an engraving
by G. Edelinck

Meanwhile he had become intimate with Boileau, La Fontaine, and Molière, the last named of whom produced his first tragedies, *La Thébaïde*, 1664, and *Alexandre*, 1665. At this time he entered into an acrimonious controversy with the famous Jansenist Nicole, on the subject of the drama, which completed his rupture with Port-Royal.

Between 1667 and 1677 he wrote his tragedies *Andromaque*, *Britannicus*, *Bérénice*, *Bajazet*, *Mithridate*, *Iphigénie*, and *Phèdre*, together with a comedy, *Les Plai-deurs* (a satire on the law), which was only a qualified success. By this time he was troubled with growing doubts concerning the stage; and after reconciliation with the Jansenists he abruptly severed his connexion with it. He then married and was appointed, jointly with Boileau, historian to the king. His only remaining plays were two of a religious character written between 1689 and 1691 at the request of Madame de Maintenon for performance by the ladies of St. Cyr—*Esther* and *Athalie*, which rank with his best works. Thereafter he published only four *Cantiques Spirituels* and a history of Port-Royal. He died April 21, 1699, and was buried at Port-Royal.

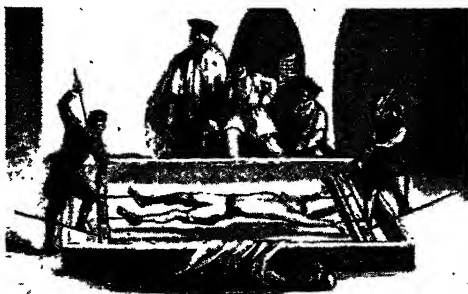
The French regard Racine as "le classique par excellence," and as one of the chief glories of their literature; and if it is impossible for English readers to share their enthusiasm, they can at least recognize his pre-eminence within his own chosen and restricted field. Far inferior to Corneille in poetic and dramatic power, he was his superior in art; the severe restraints of the classic form of drama seemed rather to help than to check his genius; and unlike Corneille, whose inequalities are flagrant, he keeps to a uniform level of excellence. With him incident as such has no importance; he uses it only as an initial force in the emotional crisis which is always his central theme; and the interest of his tragedies is purely psychological. While as a result his plays are composed only of endless talk and discussion, his skill as an analyst of passion, and especially of love, is remarkable; while the beauty of his versification deserves the highest praise. *Consult Racine et Shakespeare*, M. H. Beyle, 1854; *Racine*, G. Larroumet, 1898; *Jean Racine*, A. F. B. Clark, 1940. *Prose*, Rasseen.

Racine, LOUIS (1692–1763). French poet. He was born in Paris, Nov. 6, 1692, the younger son of Jean Racine, and, rendered independent

by marriage to a wealthy wife, devoted his life to religion and literature. His didactic poems, *La Grâce* and *La Religion*, were inspired by his Jansenist faith, and are more remarkable for their piety than for their poetic qualities. His complete works, 6 vols., were published in 1808. He compiled a *Life* of his father which was published in 1747, and translated *Paradise Lost* into French prose. He died Jan. 29, 1763.

Rack (Middle Dutch *recken*, to stretch). In machinery, a toothed bar for transmitting motion from or to gear wheels. It may be considered a portion of the pitch circle of a gear wheel of infinite diameter—a straight line. In combination with a pinion the device is used to produce motion of translation from a rotating gear wheel. Examples are the rack-and-pinion focusing arrangement for cameras and microscopes: turning the pinion causes the rack (and any part to which it is fixed) to advance and return in a straight line. In many printing machines the carriage, or table carrying the printing plates, is given a reciprocal motion beneath the cylinders by means of racks. A rack-railway, on steep inclines, has a cogged rail between two bearing rails; a driven pinion beneath the engine framework engages with the rack and pulls the engine up the incline. (*See Gear*.) The name rack is also given to a framework with bars on which articles can be stacked, as the domestic plate-rack; or to a similar framework with shelves on which articles can be placed.

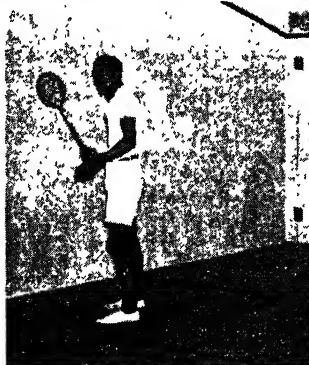
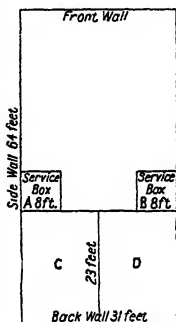
Rack. Former instrument of torture. It consisted of an oblong frame of wood on which the victim was stretched and his limbs secured by ropes which could be gradually tightened by pulleys or other devices, till the victim confessed under the stress of pain or had his limbs dislocated.



Rack. One form of the instrument of torture used in England from the 15th to the 17th century

The rack was known to the Egyptians and Romans. It was extensively used for the torture of Christians to force them to abjure their faith, and in England from the 15th century. At its greatest vogue during the reigns of Henry VIII and Elizabeth, its legality was challenged by the judges in 1628, over the attempted racking of John Felton, the murderer of the duke of Buckingham, and it rapidly fell into disuse.

Rackets or **Racquets**. Ball game played on an asphalted court, 60 ft. by 30 ft. in area, enclosed by four walls. The front and side walls are generally about 30 ft., and the back wall 15 ft., in height. A strip of board 26 ins. in height is carried along the bottom of the front wall, forming the playing line,



Rackets. The hand-in serving from the service box. Above, plan of the court

while a painted line, 9 ft. 6 ins. from the floor level, indicates the service line.

On the floor of the court, at a distance of 38 ft. from the front wall, a similar line is painted across the floor from side wall to side wall, called the short line. From the middle of this line extending to the centre of the back wall another line divides the space into two halves, termed the fault line. Just above the short line, in the angles formed by it and the side walls, are two spaces 8 ft. square, designated service boxes. The game is played by two or four players, one against one (singles), or two against two (doubles).

The racket consists of a wooden hoop 7 ins. in diameter, strung as tightly as possible with catgut, with a handle about 30 ins. long. The ball is composed of strips of cloth very tightly bound together with twine and covered with white kid, one inch in diameter and one ounce in weight. The server (or hand-in) stands in one of the service boxes, striking the ball on to the front wall above the service line in such a manner as to cause it to drop, either with or without hitting one of the other walls, behind the short line on the opposite side of the court. The opponent (or hand-out) who awaits the ball behind the short line must return it before it touches the floor twice. and the ball must strike the front wall above the board denoting the playing line, in the return. From this point of the game the server's business is to return the ball in a similar manner; this continuing until one or the other makes a fault. The game consists of 15 points or aces.

There are several English championships in connexion with rackets: the open championship (singles) for all classes, established in 1820; and the amateur singles championship, dating from 1888, being the most important. The governing body is the Tennis, Rackets and Fives Association, founded in 1907. *See Fives; Pelota; Squash Rackets.*

Rackham, ARTHUR (1867-1939). British artist. Born Sept. 19, 1867, he studied at Lambeth school of art, and became well-known as an illustrator of books, including editions of Peter Pan, 1906; Alice in Wonderland, 1907; A Midsummer Night's Dream, 1908; Wagner's Ring librettos, 1910-11; Grimms' and Hans Andersen's fairy tales; Comus, 1921; and The King of the Golden River, 1932. His most satisfying work was in a combination of pen line and colour wash, and the style was extremely personal, having something of the Gothic flavour. The elves, gnomes, and sprites which adorned his drawings recalled the gentler aspect of medieval gargoyles. He died Sept. 6, 1939.

Racking. In metallurgy, the first or an early stage in the treatment of ores and coal. The ore is thrown on to an inclined rack of stout iron bars, upon which it is washed with water to remove adherent clayey or other worthless rock. *See Mining.*

Rack Rent. Term applied to a rent which is equal, or nearly

equal, to the annual value of the land or tenement. In the Public Health Act, 1936, it is defined as a rent not less than two-thirds of the rent at which a property might be let from year to year free from the usual tenant's rates and taxes, and tithe rent charge, and deducting therefrom repairs, insurance, and other expenses. The term was formerly used in popular parlance to signify excessive rent. *See Rent.*

Racoon. Small carnivorous mammal, related to the bears. Racoons are confined to America,



Racoon. Common variety of this nocturnal animal of N. America

and include two or perhaps three species. The common racoon (*Procyon lotor*) is about 24 ins. long in body, with a tail about 10 ins. in length. It is a stoutly built and heavy animal, covered with thick greyish-brown fur, the tail being ringed with black; but it varies much in size and colour.

It occurs in N. America, but is rarely seen by day. It makes its home in holes high up in the trees, only coming down at night in search of food; it feeds upon small birds and mammals, fish and freshwater mussels, and occasionally varies its diet with young corn and fruit. In the colder districts it hibernates during the winter, but remains active in the more S. regions. Its fur is valued in the trade, and it is vigorously hunted and trapped, with the result that it is no longer numerous in many districts. In S. America the crab-eating racoon occurs. *See Coati.*

Racziewicz, WLADYSLAW (1885-1947). Polish statesman. Son of a lawyer, he was educated at Dorpat (Tartu) university. In the First Great War he was a conscript in the Russian army, and later became chief administrator of the Polish eastern provinces. He was speaker of the Polish senate shortly before the Second Great War, and after Mosicki's resignation in Sept., 1939, president of Poland, forming the first Polish government in exile (at Angers, France), under Sikorski. In 1940 he went to

Great Britain, where he helped to develop the Polish forces. Opposed to the Polish government of Lublin, 1945, he remained at the head of his government until Great Britain and the U.S.A. recognized the reconstituted Polish government at Warsaw. He died June 6, 1947.

Raczynski, EDWARD, COUNT (b. 1891). Polish diplomatist. Born Dec. 19, 1891, he was educated at Cracow and Leipzig universities, and entered the Polish ministry of Foreign Affairs

in 1919, serving in Warsaw, London, and Copenhagen. Accredited to the League of Nations during 1932-34, he was Polish ambassador to London during 1934-45. He was appointed acting minister for Foreign Affairs under Sikorski in the government in exile in London, then became chief representative of a committee on Polish-British financial transactions 1945-47; and later was given the post of adviser on Polish affairs to the British ministry of Labour.

RADAR: LOCATION OF OBJECTS BY RADIO

R. W. Hallows, M.I.R.E., Author of Radar: Radiolocation Simply Explained

Here is an account of the origins and methods of locating invisible objects, as developed, principally in the U.K., before, during, and after the Second Great War. See also Appleton Layer; Cathode Ray Tube; Magnetron Valve; Radio, etc.

Radar is the name given to a system of locating objects, whether stationary or in motion, on land, in or on the sea, or in the air, by means of pulses of radio waves. A pulse emitted by the transmitter strikes the target and is reflected back from it to a receiver placed near the transmitter. The range is determined by timing the out-and-home journey of the pulse. The bearing is found by measuring the azimuth angle from due north at which the pulse returns. To locate an airborne target, its height is also required. This is obtained, automatically or by calculation, from the measured vertical angle of the return path.

The basic principle of radar—the fact that very short radio waves can be reflected—was generally known in the early 1920s. Sir Edward Appleton suggested in 1923 that the height of the upper reflecting layer in the atmosphere (the Appleton or F layer) might be determined by "shooting" short-wave radio pulses vertically upwards and timing the interval between their transmission and their return as echoes. Within a few years this method was in regular daily use at observatories in many parts of the world. Meanwhile communications engineers and radio amateurs had observed and reported that interference with shortwave radio signals might be caused by reflections from passing aircraft; and in many countries men had realized that apparatus might be contrived to give early warning of the approach of aircraft.

But it is a long step from the knowledge of a principle to the production of practical apparatus.

The U.S.A., Germany, France, and perhaps some other countries had a few clumsy, complicated, and not very accurate radar sets when the Second Great War broke out in Sept., 1939. Great Britain alone had a complete and highly developed radar system of proved reliability. In 1935, Sir Robert Watson-Watt demonstrated to the authorities that such an apparatus was possible, and it was decided to concentrate every effort on developing it as a form of defence. By the autumn of 1935 the first radar station in the world was working regularly in the U.K. It could detect aeroplanes up to a range of 50 m. By 1938 the range had been increased to 150 m. and the erection of a complete chain of coastal stations was under way. Nearly completed when the war started, this chain was then rapidly finished. It was soon followed by the building of a second chain, designed to detect low-flying aircraft. The existence of these two chains, and of the radar apparatus which had been developed for use with A.A. guns, was a substantial contribution to the winning of the battle of Britain, the key battle of the war. In no other way could the few fighter aeroplanes and the few A.A. guns available have dealt with the bombers of the German Luftwaffe. Thanks to radar, fighter planes and their pilots could be kept on the ground until they were needed; when an attack came they could be sent where most effective.

Radio waves are simply a particular section of the whole range of electro-magnetic waves, which also includes light waves. If, on

entering a room at night, a man switches on the electric light and sees a chair, he accepts this as normal. The eye is a specialised detector of visible light waves. Rays from the electric light filament strike the chair and are reflected back to the observer's eye, which thereupon registers the impression "chair." A wireless receiving set contains a detector of certain electro-magnetic waves, far longer than light waves, to which the eye cannot respond.

An object, then, may be "illuminated" by various kinds of electro-magnetic waves, but only the appropriate specialised detector can respond to the waves of the particular kind that are reflected from it. The radar set "sees" its target because (1) the radar transmitter bathes the target in an illumination by radio waves; (2) this illumination gives rise to reflection of the same wavelength; (3) the radar receiver responds to such waves. As the very short radio waves used in radar are unaffected by darkness, thick smoke, fog, mist, rain, or falling snow, radar can see when the eye is blind.

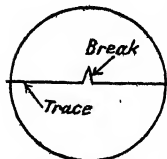
The Echo Basis

The measurement of distance or range by radar is based on the echo principle. From the known velocity of sound at sea level, an observer can calculate the distance of a vertical cliff from the point at which he is standing by noting with the help of a stopwatch the time it takes for a short, sharp shout to reach the cliff and its echo to return to him.

A pulse in the radio sense is a short, sharp burst of radiation, rising rapidly from zero to maximum intensity, enduring only a short time, and fading to zero intensity as rapidly as it rose. The range cannot be measured unless the interval between one pulse and the next is long enough for the "echo" of one to be received before the next starts. The number of pulses per sec. is called the recurrence frequency and depends on the maximum range to be measured. The longer the range, the longer the travel time, and the lower must be the recurrence frequency. Radio waves travel about a million times as fast as sound waves. Their speed varies very slightly as they travel through the emptiness of outer space or the various layers of the earth's atmosphere; but for all practical purposes their constant velocity can be taken as 186,200 m., or 300,000,000 metres, a sec.,

or 1,000 yds. in 3.05 millionths of a sec. As the pulse and its echo cover each 1,000 yds. in reaching and coming back from a target 1,000 yds. away, every 6.1 millionths of a second—3.1 micro-seconds—registered on the stopwatch of the radar receiver equals 1,000 yds. of range.

A radar transmitter sends its pulse towards the target and at the same instant delivers a synchronising, or locking, pulse direct to the radar receiver. This pulse triggers off the range line-base and starts the spot of a cathode ray on its journey across the screen. When the time-base is properly adjusted, the distance travelled at any instant by the spot is a measure of the time that has elapsed since it started to move. If the instrument is so arranged that the spot performs a complete traverse of the screen in 305 micro-seconds, and the echo returns to the receiver when the spot has made one-tenth of its journey, the time it has taken is 30.5 micro-seconds, and since 6.1 micro-seconds represents 1,000 yds. of range the range in this case



Radar, Fig. 1. The return of the echo causes a negative potential to be applied to the X_2 plate, with the result that the spot is flicked upwards and a break is formed

must be 5,000 yds. A simple and effective method of recording the arrival of the echo is shown in Fig. 1. The time base runs between the X-plates of the tube, the spot taking 305 micro-seconds to make its traverse, then flashing back and not restarting until the next outgoing pulse triggers it off. The echo pulse as it returns is applied as a "whiff" of negative potential to the Y_2 plate. The effect of this is to move upwards for an instant the beam of electrons which gives rise to the spot. When the echo pulse comes to an end (as it does in from one to three micro-seconds) the spot resumes its normal path. Thus the arrival of the echo forms a break or "blip" in the track. By means of ingenious electrical and mechanical devices the time can be measured to a fraction of one millionth of a second, and the range to within less than 25 yds. by operators after a comparatively short period of training.

Most of the radar sets in use in 1939 and 1940 worked on wavelengths measured in metres. The wavelengths of those used by A.A.

artillery were between $3\frac{1}{2}$ and $5\frac{1}{2}$ metres (84 and 55 Mc/s). The radar apparatus used for directing searchlights worked on one of the shortest wavelengths then in general use: $1\frac{1}{2}$ metres (201 Mc/s). Ranges could be measured accurately by means of these comparatively long wavelengths, but real precision in the measurement of azimuth and vertical angles (without which the direction of approach of, e.g., an aircraft cannot be ascertained) required that the radiation from the transmitter should be focused into a narrow beam. The British searchlight control radar (S.L.C.) and German sets installed in 1942 were partially successful in achieving this; but complete success could be achieved only if some means could be found of transmitting powerful pulses on wave-lengths of the order of 10 cms. (3,000 Mc/s) or less.

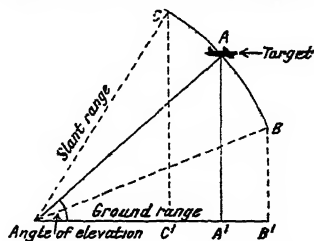
British Development

The only type of valve then known which could generate oscillations of such wavelength was the American Klystron, but this was of no use for long-range radar because its maximum power output was very small. In 1940 two British scientists, Boot and Randall, conceived the idea of an entirely new type of valve-generator, the cavity magnetron, which could operate effectively at very high frequencies. The magnetron was developed in both the U.K. and the U.S.A., for full particulars of it were sent to that country under lease-lend.

A radar transmitter could now send out powerful pulses on a wavelength measured in cms., or even fractions of a cm. Like those of light, such waves can be sharply focused into beams by means of parabolic reflectors or lens systems of sizes small enough to make their use practicable in naval, military, and air force equipment. With the best of apparatus using wave-lengths of the order of metres the measurement of azimuth and elevation angles had always a possible error of at least $\frac{1}{4}^\circ$; the first microwave radar apparatus reduced the possible error to less than 10 mins. of angle.

Radar measures the slant range—that is, the range along the line of sight to the target. An aircraft's position at any moment, however, on a flat map is vertically below its air position. As Fig. 2 shows, the aircraft would be plotted too far away if the radar angle of elevation erred on the low side and too close if the measurement had more than its true value. With

the transmitted pulses going out on a narrow beam of very short waves and with a similar focusing system applied to the aerials of the radar receiver, very close angular



Radar, Fig. 2. A, air position of target. Correct measurement of the angle of elevation enables its true position to be plotted on the map at A' . The slant ranges to B and B' are the same as that to A. At B the angle measurement errs on the low side and the target is plotted, B' , at too great a range on the map. If the error is on the high side, the target is plotted on the map at too short a range (B'')

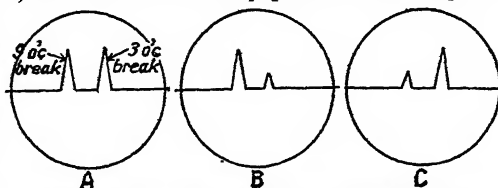
measurements are obtainable. To bring such measurements within the powers of the ordinary operator the English physicist Butevant invented the system of "split," which was applied to almost all precision radar equipment. The principle of split is illustrated in Fig. 3. The aerials needed for the transmission and reception of 10 cm. waves are about two ins. long, for shorter wavelengths (higher frequencies) they are still smaller. Such an aerial can be placed, like the bulb of a motor car headlamp at the focal point of a parabolic reflector, which focuses the radiation from it, if it is a transmitting aerial, into a narrow beam, and similarly focuses, so to speak, the directions from which it can pick up radiation, if it is a receiving aerial. The aerials are made to rotate with a slight eccentric movement; the beam into which the radiation is focused is thus made to revolve round and round an imaginary straight line which represents the direction in which the radar set is "looking."

For the measurement of bearing the receiving set is automatically switched in for an instant whenever the aerial is at "9 o'clock" or "3 o'clock," the target being regarded as at the centre of a clock face. For the measurement of angle of elevation, switching-in occurs at "12 o'clock" and "6 o'clock." The signals received in the "9 o'clock" and "3 o'clock" positions are applied to the bearing cathode ray tube, those at the "12 o'clock" and "6 o'clock" posi-

tions to the elevation cathode ray tube. Both tubes are used in exactly the same way, hence it will be sufficient to consider the events in one of them, that used for bearing measurement.

In Fig. 3A the distance from the original O to the circumference of the polar diagram of a receiving aerial is a measure of the relative magnitude of its response to signals reaching it from any direction. The response is equal in the "9 o'clock" and "3 o'clock" positions if the aerial is pointing as much to the left of the target in the former as it is to the right in the latter (Fig. 3B); this happens when the radar set is directed straight at the target. If the radar set is pointing to the right of the true position of the target, a stronger signal will be received (Fig. 3C) from the "9 o'clock" than from the "3 o'clock" echo. Should the set be to the left of the target, the "3

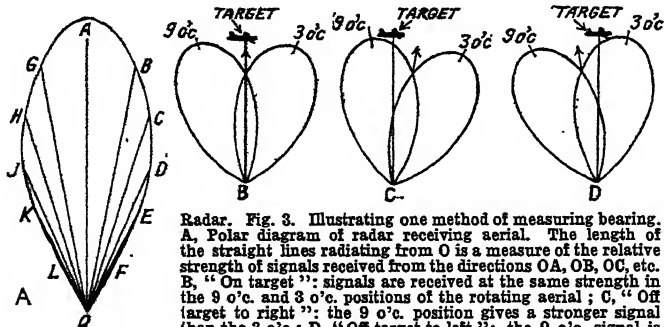
When the left break is higher than the right (Fig. 4B) the equipment is "off target to the right;" when the right break is higher (Fig. 4C) the equipment is "off target to



Radar. Fig. 4. Indications on the screen of the bearing tube. A, "On target"; B, "Off target to right"; C, "Off target to left".

the left." Fig. 4A, 4B, and 4C correspond to Fig. 3B, 3C, and 3D respectively.

The indications from the target on the bearing (and angle) tube are thus split into two separate breaks. The operator is not concerned with degrees or minutes of angle; all that he or she is called upon to do is to ensure by turning a handle that the breaks on the trace of the tube are maintained at an equal height. Ingenious devices then make precise measurements of the angle and transmit them as a continuous stream



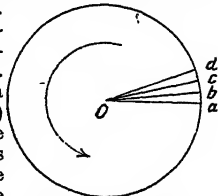
Radar. Fig. 3. Illustrating one method of measuring bearing. A, Polar diagram of radar receiving aerial. The length of the straight lines radiating from O is a measure of the relative strength of signals received from the directions OA, OB, OC, etc. B, "On target": signals are received at the same strength in the 9 o'clock and 3 o'clock positions of the rotating aerial; C, "Off target to right": the 9 o'clock position gives a stronger signal than the 3 o'clock; D, "Off target to left": the 9 o'clock signal is weaker than the 3 o'clock.

o'clock" echo will give the stronger signal (Fig. 3D).

The automatic switching system of the receiver performs a second duty. At the instant when the negative voltage resulting from the "3 o'clock" echo is applied to the Y2 plate of the cathode ray tube it causes a momentary "whiff" of extra positive potential to be applied to the X2 plate, with the result that the corresponding break is displaced to the right. Two breaks are thus side by side on the bearing cathode ray tube; the left-hand one is due to the "9 o'clock" echo, the other to the "3 o'clock" echo. If the breaks are of equal height (Fig. 4A) the two signals are of equal intensity and the equipment is "on target."

proached with the idea of such a system was, "It stinks.") H_2S and other radar systems use what are called P.P.I. (Plan Position Indicator) tubes.

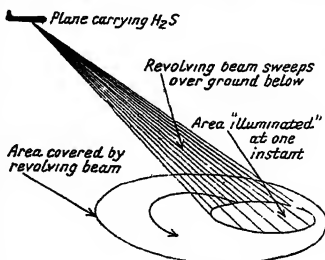
In such a tube (Fig. 5) the time base trace starts from the centre of the screen and extends outwards towards its edge, Oa. The trace revolves round the centre O in synchronism with a rotating aerial, occupying successively the positions Oa, Ob, Oc, Od, and so on. As the screen has a long afterglow, a picture is "painted" on it in this way



Radar. Fig. 5. The principle of the P.P.I. tube. The time base trace runs from the centre of the tube to the circumference. The whole trace is made to revolve, like the spokes of a wheel, in synchronism with a rotating aerial, occupying successively the positions Oa, Ob, Oc, Od, and so on. As the screen has a long afterglow, a picture is "painted" on it in this way

the positions Oa, Ob, Oc, Od, etc. The screen of the P.P.I. tube is coated with a special kind of fluorescent material which has a long afterglow, so that any part of the screen which has been made to glow by the impact of a dense stream of electrons continues to glow for rather longer than the time needed for the trace to make a complete revolution about the centre.

Fig. 6 indicates how the beam from the revolving aerial is made to sweep over the ground below. Water sends back no echoes; fairly strong ones are returned by the surface of flat land; stronger ones still by high ground, buildings, and some other features. Strong echoes also return from ships on the surface of water. The echo pulses are applied to the grid of the P.P.I. tube in the form of positive voltages with values corresponding to the strength of the



Radar. Fig. 6. Showing diagrammatically how the rotating H_2S beam sweeps over an area of ground

of information to the place where it is required.

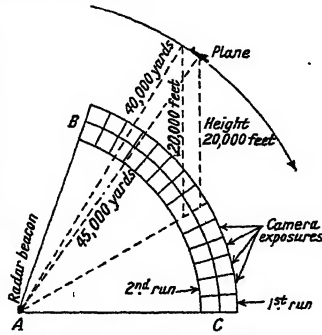
A type of radar equipment, A.I. (Aircraft Interception), was invented so small and light that it could be carried in a fighter plane, the pilot of which was thus enabled to "see" at a considerable distance the moving bomber that was his target. The system called " H_2S " was developed to make it possible for aeroplanes to spot submarines and other seacraft, and later to provide the navigator of a bomber with a fairly clear picture of the ground below him. (The name " H_2S ," symbol for sulphuretted hydrogen, is said to have been given this type of radar because the response of one of those engaged in radar research when ap-

echoes. If there is no echo, the electron beam remains cut off and there is no fluorescence of the screen; a very strong echo permits a dense beam to strike the screen and so produces a brilliant white point on it; echoes of intermediate strengths give rise to corresponding degrees of illumination. As the time base revolves, a picture of the main features of the land and water below is built up on the screen. The picture remained rather a rough one at the end of the Second Great War; but the use of shorter waves and of a time base revolving at high speed must eventually lead to radar television with a picture on the P.P.I. tube almost as clear, detailed, and accurate as that on the ground glass focusing screen of a camera. A form of H_2S provides one of the most useful navigational services for peacetime flying, for it enables the navigator to "see" in any kind of weather what is below him and ahead of him on the surface of the ground. Similar gear is installed in great ocean liners and many other ships, making navigation safe in darkness, falling snow, or fog, in island-studded or rocky channels, and in narrow waters where there is heavy traffic.

Radar Beacons

Both air and sea navigational systems make much use of radar beacons. Their basic principle was developed from that of a wartime device called I.F.F.—Identification, Friend or Foe. Friendly aircraft carried a very small radar transmitter yoked to a compact receiver of a special kind. Normally the transmitter was quiescent; but when the train of pulses from a ground radar set reached the receiver it brought the transmitter into action. The transmitter sent out a pre-arranged train of pulses, forming a code recognition signal. A very slight delay was introduced between receiver and transmitter; the I.F.F. pulses were therefore received by the ground station a little after the radar echo pulses. They thus appeared on the screen close to, but a little behind, the target which they identified as friendly. One of the best-known wartime beacon systems was "Rebecca-Eureka." Rebecca was a pulse transmitter carried by aircraft; Eureka was a portable beacon dropped with parachute troops and set up by them at a particular point. By "homing on" to Eureka, following aircraft could drop supplies, ammunition, or reinforcements where they were needed. Fixed

beacons of the Eureka type are used as navigational and landing aids for passenger and freight aircraft. Similar beacons installed at the entrances to harbours, marking danger points or indicating deep-water channels, help to guide shipping.



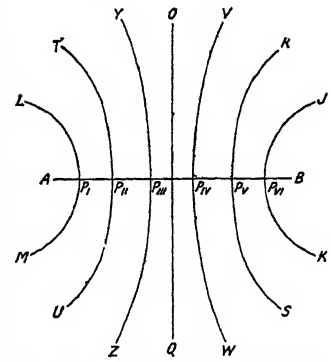
Radar. Fig. 7. Map-making by radar. On the first run the plane flies at a height of, say, 20,000 ft. and at 45,000 yds. from the radar beacon. The automatic camera thus makes exposures covering the country lying on an arc of a circle of which the radar beacon is the centre. The second, third, and succeeding runs are made at the same height, but at progressively shorter ranges. In this way a detailed photographic picture is built up of the whole segment ABC

Vast tracts of almost unexplored land in, e.g., Africa have been accurately mapped with the aid of radar beacons. Fig. 7 indicates how this is done. A plane fitted with automatic cameras, which photograph the ground below every few seconds, flies at a fixed height and at a fixed distance from the beacon. The photographs made during a run cover an area of ground which is the arc of a circle of which the beacon is the centre. The next run, flown at the same height, may be at rather shorter range, so that the photographs are of another arc, parallel to the first and just overlapping it. In this way an accurate picture of the whole surface is obtained, from which a good map can be made.

Rebecca and Eureka have a special peacetime use in the refuelling of air liners in flight. Both Rebecca and Eureka are airborne, and the liner and the tanker aeroplane "home on" to one another in the neighbourhood of a chosen rendezvous. The petrol hose trailed by the tanker is then caught by the liner, the fuel transferred, and the hose cast off.

Since the pulses that they send out are not echoes, beacons are not radar devices in the strict sense of the word. As, however,

so many radar principles are involved in their working, they are always included in the radar category; there are other important navigational devices, all classed as radar, which do not make use of either echoes or pulses sent by a triggered transmitter. One system makes no use of echoes, triggering, or pulses. But they were developed by those engaged in radar research, and much of the necessary apparatus is founded on radar technique. All these semi-radar equipments use the principle of hyperbolic navigation. Suppose that there are two ground stations, A and B in Fig. 8, whose working is interlocked so that B always transmits a pulse 500 micro-seconds after A has done so. So long as X, the aeroplane or ship using hyperbolic navigation, is at exactly the same distance from A and B it will always receive the B pulses 500 micro-seconds after the A pulses. The only possible positions of X at which it is equidistant from A and B, and at which the B pulses are received 500 micro-seconds after the A pulses, lie on the straight line OPQ. This form of radar is concerned with a single, not a double, journey of the wireless waves; hence the time taken to cover 1,000 yds. of

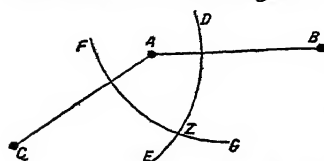


Radar. Fig. 8. Illustrating the basic principle of hyperbolic navigation. See text

range is 3.05 micro-seconds. Suppose that the distance from X to B is 100,000 yds. less than to A. The A pulses take 305 micro-seconds more to reach X than those from B, and the delay due to the shorter path of the B pulses becomes $500 - 305 = 195$ micro-seconds. All the possible positions of X at which the delay is reduced to 195 micro-seconds lie on a curve such as RP_VS , which is a hyperbola. Similarly, if X is nearer by 100,000 yards to A than to B, the delay will be increased

by 305 micro-seconds, and the position of X will be somewhere on the hyperbola $TP_{II}U$. Other differences in range between X and A and B are indicated by hyperbolae such as $VP_{IV}W$ and $YP_{III}Z$. Hyperbolae corresponding to other range differences are shown at $JP_{VI}K$ and $LP_{I}M$.

The introduction of a third transmitter (C, Fig. 9), also interlocked with A and B, makes it possible to fix the exact position of X. From the delays between the A and B pulses the operator on board X knows that he is somewhere on the hyperbola DE; from the A-C delays, he finds that he is somewhere on FG. He can now fix his position at Z where DE and FG intersect. On the navigator's



Radar. Fig. 9. By the use of a third station, the navigator is enabled to fix his position, Z, at the intersection of two hyperbolae. See text

chart the curves of the two sets of hyperbolae represent much smaller time (and therefore range) differences than these suggested; they form a fine lattice over its surface, A-B curves being coloured differently from A-C curves. The navigator using any of the hyperbolic systems, such as Gee (British shortwave, medium range equipment), Loran (U.S. long wave, long-range equipment), or Decca (British very long wave, medium-range equipment), can fix his position very closely at any instant. The Decca apparatus has an indicator on which the numbers of the lattice lines forming the "fix" are shown in figures like those of a motor car speedometer. Formerly the ships bringing coal to London's gasworks from northern ports were sometimes held up for days by coastal fog. Fitted with this navigational equipment, they can sail in any weather except the most violent storms.

Radar is used in the "blind landing" equipment of aircraft and airports. In thick weather an incoming aeroplane, located by one type of radar, can be directed to circle in a safe area until its turn comes. It can then be directed into the landing beam, which guides it on to the runway. With systems such as the "talk you down" the pilot can place himself

entirely in the hands of the controller on the ground, doing nothing except obey the orders he receives. The controller, knowing from instant to instant the exact height, speed, and position of the unseen aeroplane, can give the pilot directions which ensure a safe landing.

Radar has been found of considerable use in meteorology, since with its help cold fronts and violent storms can be detected and located. The exact height of clouds can also be measured by radar. Radar echoes have been received from the moon; and radar may provide a means of measuring accurately the distances of some of the other nearer heavenly bodies. Meteors are regularly recorded and counted by radar. The echoes come not from the meteors themselves, which are generally far too small to produce sufficiently powerful reflections of radio waves, but from the long trail of ionised air which each leaves in its wake as it passes through the earth's upper atmosphere. Radar observation has made it possible to record the occurrence of meteors in the daytime when their light is too feeble to be detected by the human eye.

Radautz. Town of S. Bukovina, Rumania. Situated 32 m. E.S.E. of Cernauti, close to the Prut and the frontier of the U.S.S.R., it has manufactures of machinery, paper, and leather, and has been noted for horse breeding. Pop. est. 17,000.

Radbertus. Medieval theologian. Born about 800, he became a monk at Corbie, in N. France, and there he passed his life in teaching and study. He was for a few years abbot of the house, and he died about 860. Radbertus made a reputation as a theologian by his work *On the Body and Blood of Our Lord*, one of the earliest works on the subject of transubstantiation.

Radcliffe. Municipal borough and market town of Lancashire, England. It stands on the Irwell, 7 m. by rly. N.W. of Manchester. The buildings include the old church of S. Mary, dating from the 13th century and restored in the 19th. The industries include the making of cotton, paper, and chemicals; dyeing and bleaching; engineering and iron-founding. Radcliffe votes with Bury. Market days, Tues. and Fri. Pop. 27,500.

Radcliffe, ANN (1764-1823). British novelist. Born in London, July 9, 1764, the daughter of William Ward, in 1787 she married William Radcliffe, afterwards pro-

prietor of *The English Chronicle*. In her stories the influence of certain aspects of the prevailing romantic movement is marked. Her fame rests chiefly on *The Mysteries of Udolpho*, 1794, which enjoyed great contemporary vogue. *The Italian*, or the Confessional of the Black Penitents, 1797, was received with equal enthusiasm. She died Feb. 7, 1823. In handling the mysterious and supernatural in such a way as to keep the reader's attention at fever pitch until the dénouement, when the supernatural is explained away, Ann Radcliffe has scarcely a superior. She excels in description of scenery, but her characterisation is weak.

Radcliffe, JOHN (1650-1714).

English physician. Born at Wakefield, he was educated at Univer-

sity College, Oxford, taking a degree in medicine. In Oxford and then in London he made a reputation as a physician, and became medi-



John Radcliffe
After Kneller

cal attendant to William III, Mary, and Anne. He was a member of parliament, and died at Carshalton, Nov. 1, 1714. Radcliffe is known as a benefactor to Oxford, as with money bequeathed by him were built the library, observatory, and infirmary that bear his name, which is also perpetuated by travelling fellowships for students of medicine.

Radcliffe Infirmary. Hospital in Oxford, built 1752-70, from funds bequeathed by John Radcliffe (v.s.). In 1940-41 it became famous for the startling results of the penicillin (q.v.) experiments carried out there.

Radcliffe Library. Building in Oxford, also known as the Radcliffe Camera. It was erected 1737-49, by John Gibbs, with £40,000 bequeathed by John Radcliffe (v.s.), who also left money to remunerate a librarian. At one time known as the Physic Library, in 1860 it was lent to the university as a reading room for the Bodleian (q.v.). It is a large, domed, circular building, 100 ft. in diameter, and stands in Radcliffe sq., behind the church of S. Mary the Virgin. The dome is conspicuous in the city. See frontispiece to vol. 1.

Radcliffe Observatory. Astronomical observatory formerly at Oxford, now at Pretoria. It was founded in 1771 with funds

provided under the bequest of John Radcliffe, and built during 1772-95. Its observations were first published in 1839. The site was sold in 1929 and the proceeds used to erect in 1935 a 74-in. telescope at Pretoria, S. Africa. The main mirror was added in 1948, the nucleus of a new observatory thus being formed.

Radegunde (d. 587). Frankish saint and queen. The daughter of a pagan German prince she was captured by and married the Frankish king, Clotaire, about 530, having become a Christian. By her piety she won considerable renown. In consequence of a feud between her husband and her kinsfolk, she left Clotaire and became a nun, founding a religious house at Poitiers. She died Aug. 13, 587. Canonised, she has a festival on Aug. 13.

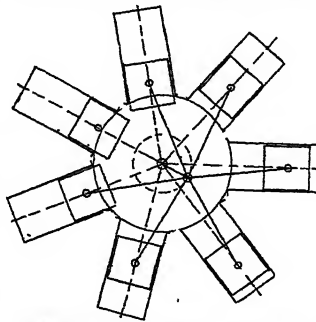
Radetzky, JOHANN JOSEF, COUNT (1766-1858). Austrian soldier. Born in Bohemia, he served against the Turks in 1788-89, and in the wars against Napoleon, at Mar-engo, Wagram, and Leipzig. Remarkable for bravery and popularity, he was made marshal in 1836, and at 82 he was commander-in-chief in Lombardy when the revolt broke out there in 1848. Though at first hard pressed, he eventually defeated Charles Albert of Sardinia at Custoza, July 25, and in the following year secured a victory at Novara, March 23, and besieged and took Venice. He was governor of Lombardy till 1857, and died Jan. 5, 1858.

Radhanpur. Town and former state of India, now in the Saurashtra union. It lies between Baroda and the Rann of Cutch, and is drained by intermittent streams, rising in Mt. Abu. The town lies 150 m. N.W. of Baroda. There is some local trade in wheat, grain, cotton, rice, and sugar. Area 2,016 sq. m. Pop., state, 100,644; town, 13,400.

Radial Artery. Artery running from immediately below the bend of the elbow to the outer side of the palm of the hand. Just before crossing over the wrist it can be felt beating beneath the skin, forming there the well-known pulse.

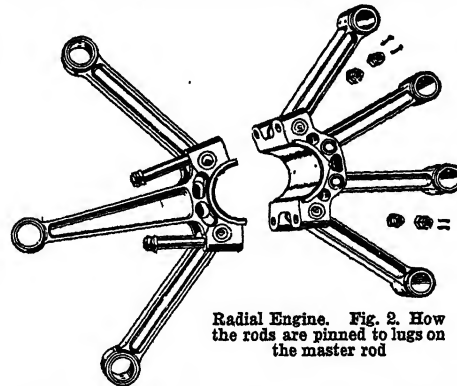
Radial Engine. Air-cooled four-stroke petrol engine. It suits aircraft on account of its accessibility, large exposed cooling surface, and ease of replacement. It has good balance and freedom from torsional vibration. Single-row, two-row, and even three-row radials are common. In the single-row, there are usually 5, 7, or 9 cylinders, with a single crank (Fig.

1). The cylinders are attached to a fixed frame and the crank rotates. The big end of one connecting rod,



Radial Engine. Fig. 1. 7-cylinder engine spaced round a single crank

known as the master rod, is joined to the crankpin; the ends of the remaining rods are pinned to lugs



Radial Engine. Fig. 2. How the rods are pinned to lugs on the master rod

on the master rod (Fig. 2). These pins transmit the same load to the crank as the main rod, but a smaller bearing surface is permissible because the angular movement relative to the main rod is comparatively small.

In earlier engines fitted with overhead valves, multi-lobed cams, revolving slowly, operated the inlet and exhaust valves through push-rods. Armstrong-Siddeley and the Bristol Aeroplane Co. achieved notable successes with this type. Some engines of high power are operated by sleeve

valves (*q.v.*), first introduced and developed for aircraft by the Bristol Aeroplane Co. These give quieter running, simplify construction, permit the use of much higher mean pressures in the cylinders, and reduce maintenance difficulties. Damage to the working surfaces does not involve the replacement of a cylinder, only of the valve.

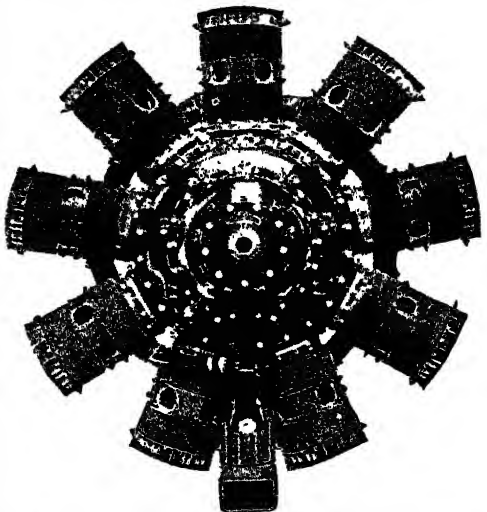
Fig. 3 is a front view of the Bristol Perseus engine, showing the inlet and exhaust ports of each cylinder, these being opened and closed by the internal sleeve valve. This engine developed over 1,000 b.h.p. at 2,700 r.p.m. The Bristol Hercules and Centaurus have two rows of cylinders, the rear row being staggered in relation to the front row in order to permit free flow of air over both. The Centaurus is supercharged to develop a maximum b.h.p. of over 2,000.

Radial Nerve.

One of the terminal branches of the musculo-spiral nerve (*q.v.*). It is the nerve of sensation to the back of the lower third of the forearm and the back of the thumb, the index and middle fingers, and the outer side of the ring finger.

Radial Velocity.

In astrophysics, the speed of motion of a heavenly body towards or away from the observer. It is measured spectroscopically by means of the



Radial Engine. Fig. 3. Front view of a Bristol Perseus engine, showing inlet and exhaust ports

Doppler (*q.v.*) effect, which shifts the spectrum lines towards the red if the radial velocity is positive (recession) or towards the violet if it is negative (approach). Speeds higher than about 1 m. a second can be measured, and stars travelling ten times as fast as this are common. By combining the radial velocity with the proper motion (*q.v.*), the true speed and direction of motion of the star can be found.

Radian. A unit of angular measure. One radian is the angle subtended at the centre of a circle by an arc equal in length to the radius. It equals 57.2958° .

Radiation. The emission by material bodies of energy in the form of electromagnetic waves. These are similar in character to those used for radio transmissions but differ widely in wavelength. The electromagnetic theory has been modified during the 20th century by the ideas which have arisen from new conceptions of the atom and of the release of its energies by dislocations and recombinations; according to the views enunciated by Planck (*q.v.*), radiant energy is given out in minute pulses. Experiments indicate that radiant energy has a dual characteristic, in some cases behaving as Planck stated, but in others adhering to the older idea of transverse waves. Radiant energy may be explained from the example of a hot body surrounded by a gas. Heat is lost by conduction through the gas (*e.g.* air) or by convection currents set up in it, both processes being dependent upon the presence of material particles in the air. On the other hand, should the body be suspended in a vacuum, energy will be radiated from the body to the walls of the vessel. The net effect of the radiation depends upon the nature and temp. of the body and the walls of the vessel involved in this exchange of energy, *e.g.* a fall in the temp. of the former will result if it radiates energy faster than it absorbs it. According to the theory of exchanges, all solids give out radiant heat within a range of wavelengths dependent upon their temps., and when a solid is hotter than its surroundings it gives out more heat than it receives. A good absorber is also a good radiator, and while a white or highly polished metal surface absorbs little energy a dull black surface, at the same temperature, is much more efficient. If solids are heated to red or even white heat, different amounts of energy will be emitted; further, the solid which is black at ordinary

temps. gives out the most radiation at the higher temps. Hence the ideal substance which, at any temp., will emit the maximum possible amount of radiant energy in all wavelengths is termed a perfect or "black-body" radiator.

Stefan's law states that with a perfect black body the intensity of radiation emitted is proportional to the fourth power of the absolute temperature of the surface. Also, from a graph where the distribution of energy over the wave-band, for a perfect radiator at a given temperature, is shown by plotting the energy as ordinate and wavelength as abscissa, the relationship of energy to wavelength can be obtained for any other temp. by varying the abscissa scale inversely as the fourth power and the ordinate scale inversely as the fifth power of the absolute temperature.

The Sun's Radiation

The most important and familiar natural radiator is the sun, which emits energy as short visible waves of light and longer invisible waves of heat; the difference is one of wavelength, because when a body is exposed to light it warms up just as by the absorption of radiant heat. If a beam of sunlight is passed through a prism it spreads out into a band of colours varying from violet, at one end, through blue, green, yellow, and orange, to red at the other. Rays beyond the violet are known as the ultra-violet, and rays beyond the red as the infra-red or heat rays. On the assumption that the sun is a black-body radiator at a temperature of $6,000^\circ \text{A.}$, the energy-wavelength curve shows the greatest intensity about a wavelength of 0.5μ , *i.e.* the blue-green region of the spectrum. About half of the total energy is in the range of wavelengths $0.4\text{--}0.7 \mu$ (visible rays); most of the remainder at wavelengths greater than the 0.7μ of the visible red rays; and practically the whole within the limits $0.2\text{--}3 \mu$ (*i.e.* short-wave radiation). The earth's surface acts as an almost perfect radiator, and the radiations from the earth or its atmosphere (at temps. of about 300°A.) are within the limits $4\text{--}50 \mu$ (*i.e.* long-wave radiation). Snow surfaces appear white because they reflect a high proportion of the solar rays falling upon them, but they readily absorb long waves and at their own temps. are effective black-body radiators.

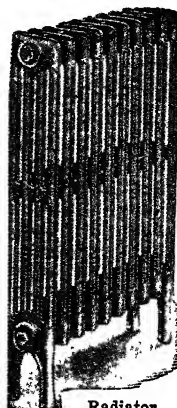
The principal gases of the atmosphere, oxygen and nitrogen, are transparent to practically all

of the solar and sky radiation and also to that which the earth re-transmits. Carbon dioxide and water vapour, however, strongly absorb energy at certain wavelengths; hence the latter, as clouds, plays a major rôle in regulating the temperature of the globe. The cooling of the ground on a clear night is a result of the outgoing long-wave radiation exceeding that coming down from the sky; at sunrise cooling ceases as the incoming radiation becomes sufficient to compensate for the loss of heat. The most conspicuous signs of appreciable terrestrial radiation are deposits of dew and hoar-frost. It is believed that the absorbing power of water vapour is equally important in the meteorology of the upper atmosphere, for it is mainly because of the absorption of long-wave radiation that the temp. of the stratosphere is maintained. See Energy; Heat; Light; Radio-activity.

A. J. Drummond, F.R.Met.S.

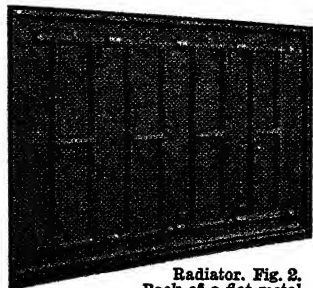
Radiator. Any body capable of emitting energy in the form of rays. Such energy is given off in all directions, but with greatest intensity only in rays projected perpendicularly from the emissive plane, the intensity varying directly with the sine of the angle of inclination. For this reason, a spherical surface, whether concave or convex, is more efficacious than any arrangement of plane surfaces. Greatest concentration of energy occurs at the centre of a spherical container, and the widest dispersal is from the outer surface of a sphere, as with the sun. The term is equally applicable to heat, to light and electrical impulses, and to all radio-active substances.

In reference to heat, this name is popularly misused to describe apparatus essentially convective. Examples are the room-warming radiator, and the nest of water-cooling tubes in front of a motor car. In both, the heat-dispersing surfaces are arranged in columns backed with hot water to provide a maxi-



Radiator.
Fig. 1. 4-column
room-warming
radiator
Ideal Boilers and
Radiators, Ltd.

mum area for contact with air. All such fittings are designed to permit or create a convected flow of relatively cool air between the heated columns, so that heat may be conveyed away by the warmed air. A



Radiator. Fig. 2.
Back of a flat metal
plate radiator, showing waterways
Ideal Boilers and Radiators, Ltd.

room-warming radiator is shown in Fig. 1 for comparison with the flat panel of Fig. 2.

The room-warming device is frequently a flat metal plate provided with hidden waterways (Fig. 2) coupled to a system of hot water pipework. These may be arranged as wall or ceiling panels backed by thick insulating pads, and so placed as to remain unobscured by furniture and curtains. Floor-warming panels are fitted with expanded metal on which a concrete or terrazzo floor is laid. Another arrangement converts some part of the walls and/or ceiling of a room to a radiator.

Emissivity and reflectivity of a radiator are materially affected by the nature of the surface, but not appreciably by the colour. A dull matt makes for the greatest emissivity; the higher the surface polish, the better the reflectivity. Paints having metallic bases, copper, bronze, or aluminium, will reduce the emissivity of a heat radiating surface by fully 50 p.c. Gas- and electrically-heated radiant panels, usually of a ceramic material, are normally placed at high levels because of the relatively high operating temperatures.

Radical OR RADICLE (Lat. *radix*, root). Term applied in chemistry to elements (simple radicals) or groups of elements (compound radicals). It usually denotes a compound radical or group of units capable of passing unaltered from compound to compound. Radicals have no separate existence and can exist only in combination with one another as compounds. The names of radicals generally end in the syllable -yl, examples being hydroxyl (OH); carbonyl (CO); thionyl (SO); methyl (CH₃); carboxyl (COOH);

sulphuryl (SO₂); phosphoryl (PO); nitroxyl (NO). Among exceptions to this rule are ammonium (NH₄), and cyanogen (CN). Radicals are acidic, basic, or neutral in character. Two radicals of similar character do not combine unless they are both neutral.

Free radicals are those which can exist under certain conditions as separate entities. These are usually classified as of short life, e.g. methyl (CH₃) having an existence of a fraction of a second; or of long life, e.g. triphenylmethyl (C₆H₅)₃C.

In mathematics, a radical is a quantity that is, or is expressed as, a root of another; also the root sign, $\sqrt{\quad}$, $\sqrt[3]{\quad}$, etc.

Radical (Lat. *radix*, root). Term applied to those who desire large changes in the social and political order. In Great Britain the Radical party has been an advanced section of the Liberal party; its equivalent in France is the Left. The word was first used for politicians towards 1800, and after the French Revolution it became a popular term for those—Orator Hunt among them—who held advanced opinions. It was also applied to thinkers such as Bentham and James Mill, who were individualists and economists, but later Radicals believed in a constant enlargement of the area of state control. See Left; Liberal; Politics.

RADIO; WIRELESS SOUND TRANSMISSION

R. W. HALLS. M.I.E.E., Author of *Wireless Simply Explained*, etc
An explanation of the transmission and reception of signals by electro-magnetic waves, without the use of wires. Allied subjects are Radar; Telegraph; Telephone; Television. See also Appleton Layer; Broadcasting; Electro-Magnetic Wave; Frequency Modulation; Heaviside Layer; Quasi-optical Waves; Thermionic Valve

Radio (Lat. *radius*, ray) is the name given to the system whereby messages are transmitted to and received at distant places by means of electro-magnetic waves without the use of cables, wires, or other physical connecting links. Such messages may be in the form of the speech sounds of telephony, the speech, music, and other sounds of broadcasting, or the morse signals of telegraphy. Television is another branch of radio, the messages in this case having the form of gradations of light and shade into which visual images are dissected at the transmitter and from which the images are built up at the receiver. Yet another department of radio is radar.

The electro-magnetic waves used for the various forms of radio have the greatest wavelength, or lowest frequency, of all those known. They are classified as follows:

Wavelengths	Classes	Corresponding Frequencies
Above 10,000 m.	Very long waves	Below 30 Kc/s.
1,000–10,000 m.	Long waves	300–30 Kc/s.
100–1,000 m.	Medium waves	3 Mc/s.–300 Kc/s.
10–100 m.	Short waves	30 Mc/s.–3 Mc/s.
1–10 m.	Ultra-short waves	300 Mc/s.–30 Mc/s.
Below 1 metre	Micro-waves	Above 300 Mc/s.

Wavelengths of 1–10 metres are sometimes spoken of as metric, those from 1 cm. to 1 m. as centimetric, and those below 1 cm. as millimetric.

Each of the classes shown in the table has its own particular characteristics. In general, the attenuation, or loss of energy, due to the

resistance of the ground is comparatively light for waves of low frequency (great wavelength) as they follow the contours of the earth; the attenuation increases as the frequency is raised. Exactly the reverse, however, occurs when waves are turned back to earth by one of the reflecting layers; the higher the frequency (or the shorter the wavelength) of the reflected wave, the less is the attenuation that it suffers. Thus the very long waves have almost no reflected, or "sky-wave," component; while the short waves have negligible "ground-wave" ranges, but cover enormous distances by reflection. The very long waves travel over the surface of the earth and may have a world-wide range if emitted by high-powered transmitters. They are chiefly used by commercial telegraphy stations. The long waves also follow the contours of the ground; but being of higher frequency they have a more limited range. They are used by commercial telegraphy

stations and by certain long-wave broadcasting stations. The medium waves follow the ground contours, but are also reflected back to earth from the Heaviside layer (or E-layer) after dark. Distant transmissions are not heard by day, since the ground wave has but a limited range owing to heavy at-

tenuation. By night the reflected wave, or sky wave, may provide reception at great distances. The phenomenon called fading is due to the interaction of waves arriving by different paths. When two sets of waves arrive at the receiving aerial "in step" (in phase) the resulting signal is very strong. No signal at all is received if waves of equal amplitude cancel out by arriving exactly "out of step" (180° out of phase). Between these two extremes an infinite number of modifications due to interaction may occur. The medium waves are used chiefly for broadcasting and for short-range ship communications.

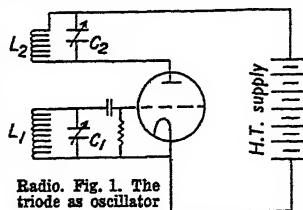
The short waves travel almost entirely by reflected paths. Reflection in this case takes place from the Appleton layer or F-layer. The most suitable wavelengths for long-distance communication vary according to the direction, the time of day, the season of the year, and the point reached in a sunspot cycle. By the use of the right wavelengths world-wide transmissions can be made with comparatively small power. The short waves are used for international telegraphy, telephony, and broadcasting. Fading on these wavelengths is due to the interaction of waves arriving by two or more different reflected paths.

Normally the ultra-short waves and the micro-waves are quasi-optical. They are not reflected by the E-layer or the F-layer, and their range is little beyond the horizon as seen from the transmitting aerial. In exceptional conditions, however, they may span much greater distances. They are used chiefly for short-range communications, such as police telephony, and for television. One of the features of the micro-waves is that they can readily be focused or concentrated into a beam; this is made use of in radar.

Electro-magnetic waves are made to convey a message by the process known as modulation. The transmitter when "idling" sends out a train of continuous waves (the carrier wave) of the same frequency and amplitude; when a message is sent it is superimposed on the carrier by being made to cause variations in its amplitude or frequency corresponding to those of the applied signal. Amplitude modulation and frequency modulation of a continuous carrier are in general use; pulse modulation is another method.

The key to radio was provided by the invention and development

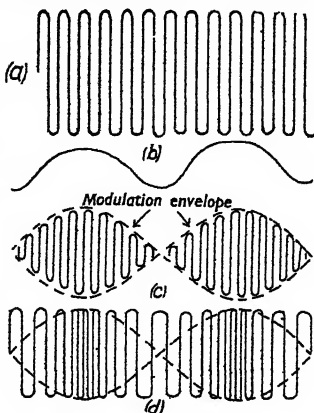
of the thermionic valve. In the transmitter power is fed to the aerial by an oscillator valve (or



team of valves). Fig. 1 shows one of the ways in which a valve may be made to oscillate. Any voltage change in the grid circuit appears in magnified form in the anode circuit. By means of the coils L_1 , L_2 , the anode circuit is coupled to the grid circuit in such a way that voltages fed back from the former circuit assist and increase those in the latter. Any energy expended in overcoming resistance in the grid circuit is more than replaced by the feed-back from the anode circuit. The resulting greater voltage changes in the grid circuit give rise to still greater voltage and therefore current changes in the anode circuit. The D.C. power, drawn from the source of H.T., is converted by the valve into alternations or oscillations, the frequency of which can be controlled, by means of the tuned circuits consisting of the coils L_1 , L_2 and the capacitors C_1 , C_2 . If the output of the oscillator is fed to an aerial, magnetic and electric fields are produced round it by each half-cycle of current and voltage respectively. Each field increases in intensity and extent as, say, the positive half-cycle rises towards its peak, and decays as it falls towards zero. The decay of the fields is not complete by the time that the half-cycle comes to an end and the next (the negative) begins. The result is that energy in the form of a magnetic and an electric field "loops off" from the aerial at every half-cycle. The direction of the fields is reversed during each successive half-cycle; a series of electric and magnetic "crests" and "troughs," or electro-magnetic waves, is thus radiated from the aerial. These form the carrier wave, usually called simply the carrier, of the transmitter, (a) in Fig. 2.

To make the carrier convey a message it must be modulated, that is made to vary in either amplitude or frequency in exact accordance with the electrical

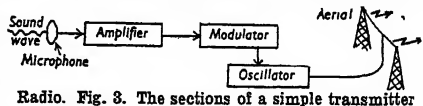
copies of the sound waves made by the microphone, or those of varying degrees of light made by the television camera. In telegraphy the carrier may either be modulated by impulses of long or short duration corresponding to the dashes and dots of morse, or it may be, so to speak, switched on and off for longer periods (dashes) or shorter periods (dots). Fig. 2 (b) shows a simple sound wave and at (c) and (d) are shown the ways in which the carrier may be modulated by it in amplitude (amplitude modulation



Radio. Fig. 2. (a) Unmodulated carrier wave of constant amplitude and frequency; (b) simple sound wave form; (c) amplitude-modulated carrier: frequency constant, amplitude varied; (d) frequency-modulated carrier: amplitude constant, frequency varied

or AM) or in frequency (frequency modulation, or FM). Fig. 3 shows diagrammatically the most important sections of a simple transmitter.

The effect of any kind of modulation is to superimpose on the carrier two bands of modulating frequencies called the sidebands. Suppose that the carrier, (a) Fig. 2, has a frequency of 600 Kc/s. and that the modulating frequency is 1,000 c/s. or 1 Kc/s. then the amplitude modulated carrier consists of



Radio. Fig. 3. The sections of a simple transmitter

a band of frequencies extending from $600 + 1 = 601$ Kc/s. to $600 - 1 = 599$ Kc/s., that is, the modulated carrier occupies not a single frequency, but a belt of frequencies, or channel, the width of which is twice the modulating frequency; if a carrier is modulated by a frequency of 1,000 c/s. or 1 Kc/s., the resulting transmission has a total

band-width of 2 Kc/s. The side-bands above and below the carrier frequency are called the modulation envelope, (c) in Fig. 2. Owing to the large number of European broadcasting stations which have to be fitted without mutual interference into the wavelengths between 200 and 550 metres (fre-

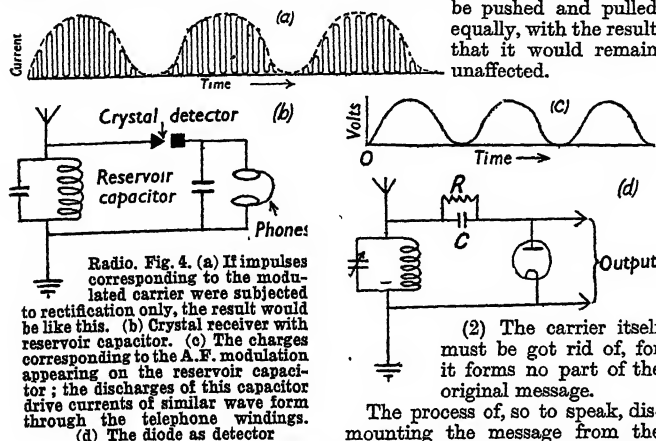
(1) One of the side-bands must be removed. If both were present they could not be made to operate apparatus which would produce an effect on the ear, for at any instant the crest of the upper side-band is exactly cancelled out by the trough of the lower: the diaphragm of a receiver would simultaneously be pushed and pulled equally, with the result that it would remain unaffected.

an audio-frequency order. The charge on the capacitor is built up by the crests of the H.F. impulses and has the resulting form seen in Fig. 4 (c). The effect of this reservoir capacitor is to mop up the H.F. impulses and to reconstitute the A.F. modulating envelope alone. In a crystal set the condenser discharges through the windings of the telephones, the diaphragms of which are made to execute vibrations (and so to produce sound waves which reach the ear-drum) in accordance with the variations of the modulation envelope.

Diode as Detector

Fig. 4 (d) shows a diode valve used as detector. Here rectification takes place because, owing to the one-way action of the valve, current can pass from cathode to anode only when the latter is at a positive potential; and these conditions obtain only during the positive half-cycles of the current set up by the incoming signals. The time constant of the reservoir capacitor C and the resistor R is (like that of the reservoir capacitor and the telephone windings in the crystal receiver) of an A.F. order. Hence the charge appearing on C is as in Fig. 4 (c).

The triode is used in two chief ways as detector. Fig. 5 illustrates anode-bend detection. Here the grid has a standing negative bias sufficient to bring the working point to the top of the bend at the lower end of the grid-volts, anode-current curve. Positive half-cycles reaching the grid allow amplified anode currents of corresponding wave form to pass; negative half-cycles result in the passage of very little current. Charges of the same wave form as the modulation envelope are produced in the reservoir capacitor. When the triode is used as a grid leak and

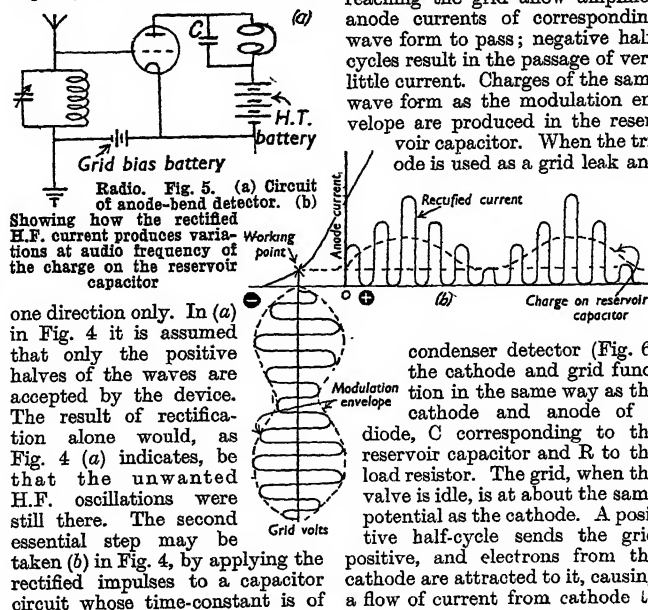


quencies between 1,500 and 550 Kc/s.), each can be allotted a channel no more than 9 Kc/s. in width. This means that audio-frequencies above 4,500 c/s. are not transmitted. The whole of the broadcast band has a frequency range of 950 Kc/s. or 0.95 Mc/s. On the short and ultra-short waves there is far more elbow room and stations can occupy wider channels. Between 20 m. and 55 m., for instance, there is only a 35 metre difference in wavelengths; but the corresponding frequencies, 15 and 5.5 Mc/s., differ by 9.5 Mc/s., or 9,500 Kc/s., or 9,500,000 c/s. The vision transmitter of the London television station actually occupies a channel 5.4 Mc/s. in width (about $5\frac{1}{2}$ times the width of the entire medium-wave broadcast band), whilst the accompanying sound has a channel 24 Kc/s. in width. Better quality is to be expected within its service area from such a transmission than from any medium-wave station owing to the greater range of audio frequencies that can be transmitted.

The modulated electro-magnetic waves sent out by the transmitter induce corresponding voltages in any aerial within their range which is tuned to their carrier frequency. Such voltages give rise in the receiving set to an electrical copy of the high-frequency carrier and both its modulating side-bands. For the message to become intelligible two things are necessary:

The process of, so to speak, dismounting the message from the carrier is known as demodulation, or detection. The following is an outline description of this process.

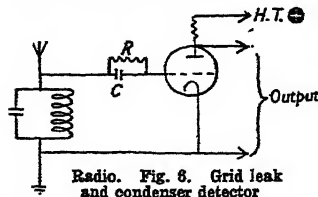
The first of the steps mentioned above is accomplished by rectification, which removes one half of each of the high-frequency oscillations, corresponding to the carrier. Rectification may be done by means of a device such as a crystal detector Fig. 4 (b) or a diode valve Fig. 4 (d) which passes current in



one direction only. In (a) in Fig. 4 it is assumed that only the positive halves of the waves are accepted by the device. The result of rectification alone would, as Fig. 4 (a) indicates, be that the unwanted H.F. oscillations were still there. The second essential step may be taken (b) in Fig. 4, by applying the rectified impulses to a capacitor circuit whose time-constant is of

condenser detector (Fig. 6) the cathode and grid function in the same way as the cathode and anode of a diode, C corresponding to the reservoir capacitor and R to the load resistor. The grid, when the valve is idle, is at about the same potential as the cathode. A positive half-cycle sends the grid positive, and electrons from the cathode are attracted to it, causing a flow of current from cathode to

grid. These H.F. flows of grid current build up across the capacitor and on the grid negative charges at audio frequency, discharge taking

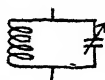


place through R . The A.F. voltage variations on the grid cause corresponding amplified changes in the anode current. The time constant of R and C is again of an A.F. order. Used in either of the ways described, the triode forms an amplifying detector.

Receiver's Tuning Circuit

The form of tuning and the tuned circuit most commonly used in the radio receiver consists (Fig. 7) of a coil and a capacitor in parallel.

Radio. Fig. 7. The parallel tuned circuit. The arrow through the capacitor indicates that its capacitance is variable



To make it possible to tune the circuit to any one of the various carrier frequencies included in, say, the medium-wave band, the capacitance is variable: one set of the vanes of the capacitor (the movable vanes) can be moved so as to mesh more or less completely with the fixed vanes. This is what takes place when the tuning knob of a wireless set is turned.

The reactance (symbol X), that is, the opposition to the passage of an alternating or oscillating current, over and above ordinary resistance, offered by either a coil or a capacitor, depends upon the frequency of the current. For a coil

$$X = 2\pi fL,$$

for a capacitor

$$X = \frac{1}{2\pi fC},$$

where f is the frequency in cycles per sec., L is the inductance in henries, and C is the capacitance in farads. At resonance, that is when the circuit is exactly tuned to the incoming frequency, X_L , the inductive reactance of the coil is precisely equal to X_C , the capacitive reactance of the condenser. These two kinds of reactance have opposite effects on the phase of the incoming oscillations. X_L causes the current to lag 90° on the voltage; X_C causes it to lead 90° on the voltage. Thus, when $X_L = X_C$ the coil current and the condenser

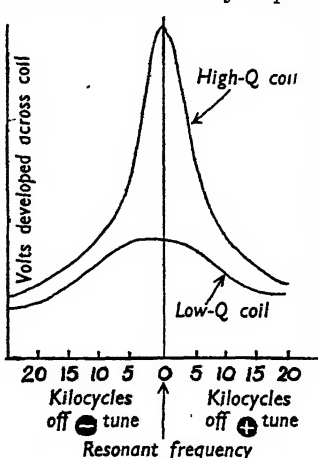
current are 180° out of phase and cancel out. Hence there is no current through the circuit and its dynamic resistance is infinitely great at the resonant frequency.

Or, rather, it would be so if the circuit contained no resistance of the ordinary kind. But, except in conditions obtainable only in an exceptionally well equipped physics laboratory, any conductor must have some resistance—and a circuit without conductors is impossible. The effect of ordinary, or ohmic, resistance is to reduce the current lag due to X_L and the current lead due to X_C . In other words, X_L and X_C cannot quite be equal and opposite, and, therefore, cannot entirely cancel out, if the circuit contains (as it must) even a small amount of ordinary resistance. The smaller the amount of this resistance the greater is the efficiency of the circuit. As most of the wire in the circuit goes to make up the turns of the coil, it is the coil that is most likely to introduce appreciable resistance. The efficiency, or selectivity, of a tuned circuit is, therefore, determined chiefly by the smallness of the resistance of the coil. The Q , or efficiency factor, of a coil, is the ratio of its reactance to its resistance:

$$Q = \frac{2\pi fL}{R}.$$

What really matters is to keep the ratio of the quantities L and R as high as possible; ideally R must be negligibly small with respect to L . The Q of a coil indicates the magnification of the applied voltage which takes place across it at resonance. One of the curiosities of alternating and oscillating current is that such magnification can take place; if it did not, radio would be impossible. Fig. 8 shows the response of circuits containing coils of different Q s to a resonant frequency and to frequencies above and below it. The higher the Q the

greater is the selectivity of the circuit. A high- Q circuit tunes in the wanted transmission by respond

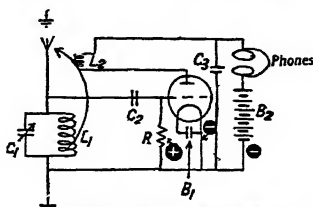


Radio. Fig. 8. Curves showing the "response" of high- Q and low- Q medium-wave coils. The voltage across the high- Q coil is high at the resonant frequency, but falls away steeply only a few kilocycles above or below it. Hence the response to the wanted signal is good and that to unwanted signals poor. The selectivity is good. On the other hand, the low- Q coil does not show a high voltage for the wanted signal and the selectivity is poor because unwanted signals many kilocycles off resonance develop voltages not markedly lower

ing strongly when tuned to its frequency. In such conditions it tunes out unwanted transmissions by responding poorly to them. Increased selectivity is obtained by the use of a number of tuned circuits in cascade. For broadcast reception with a sensitive set from 8 to 10 tuned circuits in cascade are required in order to provide an acceptable degree of selectivity.

In Fig. 9 is seen the circuit of a simple single-valve receiver. Since the coupling between L_1 and L_2 is variable, the amount of feed-back from anode to grid circuit can be adjusted until the valve is just short of oscillation. In that condition the energy fed back from the anode circuit to the grid circuit almost annuls the effects of resistance in the tuned circuit $L_1 C_1$. The Q of the circuit can become in this way enormously high in a well-designed set, with the result that the sensitiveness and selectivity may be quite remarkable.

Where a loudspeaker is used, the signal must be amplified. Normally this is done at high frequency (i.e. before detection) as well as at audio frequency (i.e. after detection). When the valve is used as an amplifier the working

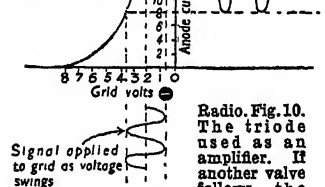


Radio. Fig. 9. A simple single-valve receiver. $L_1 C_1$, tuned circuit common to aerial and grid; L_2 , reaction coil (the arrow through L_2 indicates that the coupling between them is variable); C_2 , grid capacitor; C_3 , reservoir capacitor; R , grid resistor (or grid leak); B_1 , filament battery (or low-tension battery); B_2 , anode or high-tension battery

point is adjusted (by applying a suitable amount of negative bias to the grid) to be at about the middle of the "straight portion" of the grid-volts, anode-current characteristic. As seen in Fig. 10 no rectification then takes place and (ideally) the cycles of anode current are exact and faithful copies of those of grid voltage.

If an amplifying valve is followed by another valve, the current changes in the anode circuit of the first must be turned into corresponding voltage changes before they can be passed to the grid of the second. This may be done (Fig. 11) by making the anode current pass through the primary windings of a transformer (a), or a resistor (b). The potential drop brought about by the impedance of the former or the resistance of (b) gives the required voltage variations.

Transformer coupling is generally used for pre-detector or H.F. amplification, and resistance-capacitance coupling for the post-detector low-frequency stages. On the high-frequency side effi-



Radio. Fig. 10. The triode used as an amplifier. If another valve follows the current swings in the anode circuit can be made to appear as voltage swings by the use of a resistor or an impedance

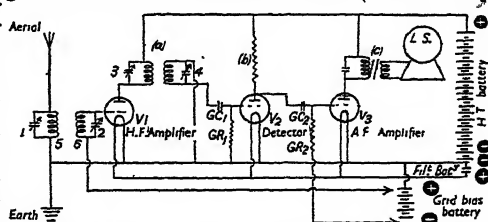
ciency combined with selectivity sufficient to exclude unwanted frequencies is required, whilst on the audio-frequency side the amplifier should ideally handle equally well all the frequencies applied to its circuits.

The only valve that is normally required to pass on current changes from its anode circuit is the output valve, for both the telephone (Fig. 8) and the loudspeaker (Fig. 11) are current-operated devices. Either telephones or loudspeakers, if suitably wound, may be connected directly into the anode circuit of the output valve; but for loudspeakers it is usual to use a transformer, (c) in (Fig. 11, whose purpose is to match the impedance of the instrument's windings with the anode circuit impedance of the output valve.

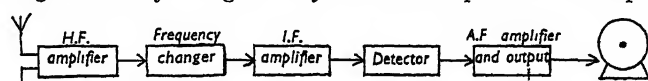
Receivers of the kind illustrated in Fig. 11 are less and less used, owing to increasing need for selectivity because of the crowding of the wavebands used for broadcasts. To obtain the 8-10 tuned circuits desirable for broadcast reception in a straight set, such as that of Fig. 11, would call for an 8-gang or 10-gang variable condenser, which would be a very expensive component.

A most successful way out of the difficulty has been found in the number within reason may be used) have fixed values of inductance and capacitance. A super-

neighbourhood of 460 Kc/s.) called the intermediate frequency. The I.F. tuned circuits (of which any



Radio. Fig. 11. Circuit of a simple 3-valve receiver, battery operated. (a) H.F. transformer coupling V_1 to V_2 . G_1 , G_2 , grid capacitor and resistor of V_1 . (b) Anode resistor of V_2 . The potentials developed across it by variations in the anode current are applied to the grid of V_2 via the grid capacitor G_2 . The grid resistor G_2 allows G_2 to discharge at the proper times and provides a path for a negative biasing voltage for the grid. (c) Output transformer. 1, 2, 3, 4. Tuning capacitors. 5. Aerial tuning coil. 6. Grid tuning coil of V_1 .



Radio. Fig. 12. Block diagram to illustrate the principle of the superheterodyne receiver. In broadcast receivers the H.F. stage is often omitted, the greater part of the pre-detector amplification being done by the I.F. stages. In such cases 8 or 10 tuned circuits can be obtained with only a 2-gang variable capacitor. The tuning of the I.F. stages is fixed and may be effected by means of small pre-set capacitors

means of the frequency changer the frequency of any carrier tuned in is automatically converted to one fixed frequency (usually in the

heterodyne receiver of selectivity adequate for broadcast reception need contain no more than a 2-gang or 3-gang variable capacitor.

RADIO-ACTIVITY AND THE ATOM

* R. W. B. Stephens, Lecturer in Physics, Imperial College of Science and Technology, London

For related information see *Atom*; *Crookes*; *Curie*; *Matter*; *Radium*; *Uranium*; *X-Rays*

The term radio-active is usually understood to apply to those substances such as uranium, radium, thorium, actinium, and their compounds, which have the special property of spontaneously emitting radiations possessing the following characteristics:

1. They will penetrate substances opaque to ordinary light; for instance, they will penetrate sheets of metal.
2. They will affect a photographic plate in a dark room.
3. They will produce luminescence and phosphorescence in certain substances placed near them, notably in barium platino-cyanide, zinc sulphide, and calcium tungstate, and in the minerals zincolite and willemite.
4. They have the power of "ionising" any gas through which they pass, that is, rendering it a conductor of electricity; hence these radiations will discharge electrified bodies.

5. They will develop heat continuously in any matter which absorbs radiation.

These properties are exhibited by other radiations, e.g. by Röntgen or X-rays, but the essential difference between X-rays and radio-active radiations is that the former have to be excited by some external agency, whereas the latter are spontaneously emitted from radio-active substances, and are entirely independent of any external exciting cause. In other words, they are due to the breaking-up or disintegration of the actual atoms of the radio-element. We may regard the latter as being in an unstable state and continuously disintegrating, giving rise to new atoms which differ entirely in chemical properties from the parent element. This instability is found in nature chiefly in the heaviest atoms, i.e. those with densities (and atomic numbers) greater than lead. Radio-active

isotopes of potassium, rubidium, samarium, and lutecium also occur naturally.

Historically, the impetus for the discovery of radio-activity was provided by the discovery of X-rays in 1895, by Röntgen. In the following year Becquerel examined a number of phosphorescent and fluorescent substances, to see if they emitted photographically active rays, and found that salts of uranium were effective, *independent of previous exposure to light*. Later, other substances were found to give off similar rays.

Special methods of measurement were devised for studying the radio-activity of these elements, the most useful being based on the ionising property of the rays. The "ionisation current," through a layer of gas exposed to the rays, can be measured by the rate at which it discharges a gold-leaf electroscope, and this gives a comparative measure of the activity of the substance used.

The next advance made was the discovery of the nature and classification of the types of rays given off by radio-active elements. Experimentally it is observed that their penetrating powers are widely different; some, for instance, are stopped by a sheet of paper, others will pass through a few inches of lead. Secondly, it is found that some of the rays are bent by a magnetic or an electric field, proving them to consist of minute electrically charged particles moving at high speed; the direction of the deviation gives the nature of the charge carried by the rays, that is, decides whether they are positively or negatively electrified, while the amount of the deviation gives an estimate of the speed and mass of the particles. Using these methods of measurement, Rutherford showed conclusively that the radiations from radio-active substances were of three distinct types, which he called the alpha, beta, and gamma rays (α , β , γ).

Nature of α and β Rays

The α rays are positively charged particles, each of mass four times that of the hydrogen atom. They are emitted at high speeds, about the order of 10,000 miles a second, but are very easily stopped, *e.g.* a sheet of ordinary writing paper will stop the swiftest known α rays. They travel up to about 3½ inches in air at ordinary pressures, but they ionise the air very intensely indeed in their short range. They will also produce very strong photographic and phosphorescent effects. Finally they have definitely

been proved to be electrically charged atoms of helium.

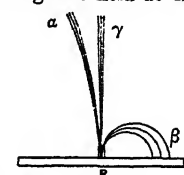
The β rays are also corpuscular in nature, and consist of very high-speed, negatively-charged particles of small mass (about two thousand times less than mass of the hydrogen atom). That is to say, β rays are electrons moving with high velocity. Their range is from 10 to 20 times greater than that of the α rays, and they can pass quite easily through thin sheets of aluminium. The fastest known β rays are emitted with velocity approaching that of light. The ionising power of the β rays, however, is only small—about 100 times less than that of the α rays.

The mass of the β rays being so exceedingly small, although their average velocity is great, their momentum is small, and hence they are easily deflected or bent by magnetic or electric fields, the direction of the deflection being opposite to that of the α rays. In character the β rays are identical with the "cathode rays" produced when an electric discharge passes through a rarefied gas.

Electromagnetic γ Rays

The γ rays are not corpuscular in nature, but consist of electromagnetic impulses of very short wavelengths. Hence in character they are analogous to X-rays. The γ rays, bearing no electric charges of any kind, are therefore not deflected in magnetic or electric fields, and are far more penetrating than the α or β rays—they will pass through several inches of aluminium. The ionising power of these rays is still smaller than the β rays, and about 1,000 times less than that of the α rays, and their photographic and phosphorescent actions are correspondingly small.

The effect of a magnetic field in separating out the radiations is shown in the figure. A beam of the rays emitted by a small amount of radium at R is subjected to a magnetic field at right angles to



Radio-activity. Diagram illustrating effect of magnetic field in separating radiations. See text

the plane of the paper, and directed downwards. The β rays are bent to the right, showing them to be negatively charged particles, and the amount of the deflection is large, proving them to be of small mass. The α rays are bent to the left, and are therefore positively

charged particles, whilst the extent of the deflection is very small (compared with the β rays), showing them to be of relatively large mass. In the diagram, the bending of the α rays is greatly exaggerated. Lastly, the γ rays go straight on without any deflection, proving them to be electrically uncharged.

In order to account for the phenomena of radio-activity, Rutherford and Soddy put forward the transformation theory, according to which the atoms of a radio-element are undergoing a process of spontaneous disintegration, with the production of new atoms possessing different, yet distinct, chemical properties. The radiations given off are parts of the disintegrating atom (hence the conservation of matter is preserved), and they provide a measure of the rate of breaking up of the atoms. The new atoms formed may be unstable and break up in their turn, giving off a characteristic type of rays, and this transformation process continues through a number of stages. There are three series of the heavy radio-active elements each ending in an isotope of lead.

The relative intensity of a radio-active source, as measured by the number of particles disintegrating per second, varies logarithmically with time.

Only about one atom of radium in about 100,000,000,000 (one hundred thousand million) breaks up every second, or about half the atoms in 1590 years, and each disintegrating atom expels an α particle. The residual atom is called radon, which is a heavy gas, much more unstable than radium, and transforms with the expulsion of an α particle to half-value in about 3.82 days. A number of succeeding transition products are derived from the radium emanation, denoted by the names radium A, radium B, radium C, to radium F, the transformation of each member of the family being accompanied by the emission of either α or β particles, or both. Each of these transition products is to be regarded as a new element, although some have only an average life of a few minutes.

Many of these products have names which were significant at the time they were so expressed, but do not indicate the nature of the isotopes they represent, *e.g.* radium C and radium E are isotopes of bismuth.

The continuous production of fresh radio-active matter by a radio-element, and the continual decay of the matter so formed, according

to a definite law, explains quite satisfactorily all the known facts of radio-activity. It is important to emphasise that these changes go on quite spontaneously, and cannot be controlled by outside agencies in any way—they proceed at the same rate, at temperatures varying from that of liquid air ($-186^{\circ}\text{C}.$) to that of an electric furnace ($2,000^{\circ}\text{C}.$), and are unaffected by chemical combination: hence the use of radio-active isotopes as "tracer elements," which make it possible to follow the course of particular substances through animal or plant metabolism.

The production of helium in the decay of uranium provides a means of estimating the age of uranium and hence of the earth, assuming the retention of the helium formed and provided no other source of the gas is present. Such investigations on terrestrial ores and on meteorites have led to estimates of the age of the earth up to 2,800 million years.

The Alpha Ray

Radio-activity has clarified our conception of the atom. It has introduced us to an electrically charged atom of helium (the α ray), which appeals to our physical sense, inasmuch as it can be detected individually, either by its action on a fluorescent screen, as in the "spintariscopes," where each atom (α particle) striking the screen produces a visible pin-point of light ("scintillation"), or by its electrical effect in causing movement of an electrometer. Devices which will indicate and record the passage of a single particle are chiefly dependent upon an observation due to Gorton, *viz.* that the voltage which has to be applied to produce a breakdown discharge from a charged conducting point could be varied considerably by irradiating the gas in the neighbourhood. These tube counters are now usually termed Geiger counters and the incidence of a single ionizing particle on such devices may be sufficient to cause a discharge. Such discharges may be rapidly "quenched" so that the counter becomes available to receive the next particle. The mechanical registration of the particles is limited to 3 or 4 thousand per minute but a system of thermionic valves may be arranged so that a single count is made for each 2^1 , 2^2 , 2^3 , or 2^4 incident particles and yet single particles can also be numbered at the same time by a system of glow lamps or a direct-reading meter. The Wilson cloud chamber is an

apparatus which gives a visible picture of the paths of fast atomic particles in gases by means of water droplets collected in the ions formed in the tracks of the particles. Photographic plates have also been used as a means of recording fast atomic particles. This method has been greatly assisted by improved photographic emulsions, and it has an advantage over the cloud chamber in being continuously sensitive.

Besides the natural radio-active substances, it is possible to produce radio-active isotopes of almost all the elements by making use of the atomic changes which take place under bombardment by various particles, chiefly neutrons. This can be done on a small scale in atomic disintegration machines (cyclotrons, synchrotrons, etc.), and on a larger scale in atomic piles. The latter have consequently become the chief sources for the supply of tracer elements for use in industrial and biological research.

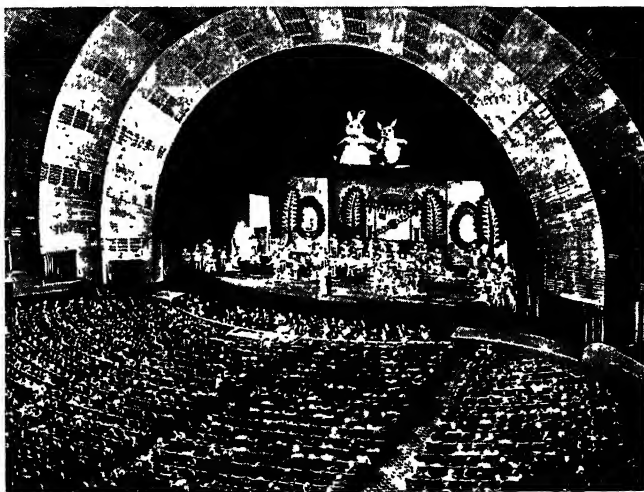
Bibliography. Radioactivity and Radioactive Substances, Sir J. Chadwick, 1932; Atomic Physics, M. Born, 1935; The Mechanism of Nature, E. N. da C. Andrade, 1938; The Mid Twentieth-Century Atom, M. Davidson, 1946.

Radio City. Group of five buildings in the Rockefeller Centre, New York. It consists of a

and is the largest office structure in the world; the R.C.A. west building, 243 ft.; and a theatre. See Rockefeller Centre.

Radio Control. Method whereby the transmission of radio impulses on a fixed wavelength actuates distant mechanisms. Attached to the mechanism is a radio receiver tuned in to the wavelength of the transmitter, and the impulses received are passed through amplifiers to be converted into mechanical power. Unmanned ships and aircraft navigated through radio control are used for artillery practice, and in the Second Great War bombs, rockets, and other missiles were thus guided to their targets. See Remote Control.

Radiograph. Name given to a photograph by X-rays (*q.v.*). It was found by Lenard in 1894 that the rays from a Crookes tube affected a photographic plate very much as light affected it, and in 1896 Röntgen obtained a radiograph of the hand, showing that flesh was almost transparent and bones by contrast opaque to the rays. The lodgement of foreign substances in the body, the fracture and diseases of bones, and even digestive processes by suitable diet, can be observed by radiographs, as can the presence of



Radio City, New York. The interior of the Radio City Music Hall, largest indoor theatre in the world

music hall, 121 ft. high and seating 6,200 people, the largest indoor theatre in the world; the R.K.O. building, 409 ft.; the R.C.A. building, 70 storeys, with an observation roof and 12 terraced gardens, which houses the studios and headquarters of the N.B.C.

some diseases, *e.g.* tuberculosis. The method has been extended to the study of the internal structure of many substances, detecting flaws in machinery castings, etc.

Radiography. Art of producing an X-ray picture or radiograph (*v.s.*). It is highly technical



Radiography. Taking a radiograph of the chest and lungs as a test for the presence of tuberculosis

and depends upon the correct choice of film, electrical factors, type of X-ray apparatus, etc., in relation to the physical characteristics of the object. Training takes at least two years and comprises a knowledge of anatomy, physiology, radiation, physics, electricity, photography, and the construction of X-ray apparatus. Radiography is classed as a dangerous occupation.

Radiolaria. Order of Protozoa, of the class Rhizopoda. They have a large number of thread-like pseudopodia, and a siliceous skeleton or shell, often of great beauty. The single-celled body is usually spherical or conical in form, and the protoplasm is divided into inner and outer portions by a kind of membrane pierced with many pores, so that both are in vital connexion. All the radiolaria are of microscopic size, and their skeletons form a considerable part of the ooze which covers large tracts of the ocean bed at moderate depths. At greater depths the ooze is exclusively radiolarian in character. Reproduction takes place mainly by fission; but at other times two kinds of flagellate spores are formed, and it is probable that these conjugate, thus exhibiting both sexual and asexual propagation. See Ocean.

Radiolocation. This subject is treated under Radar.

Radiology. Science concerned with the study of phenomena associated with X-rays. It comprises detailed knowledge of the physical characteristics of the radiations and their application to everyday use. The discovery that X-rays will penetrate opaque substances and portray their internal structure led to their early application in the field of medicine. Laboratories throughout the world investigated the physical characteristics of the rays; medical organizations correlated radiologi-

cal images with normal and pathological processes. In medicine X-rays are used for diagnosis (radio-diagnosis) and for treatment (radio-therapy). This work being dangerous, recommendations for protection of X-ray workers were introduced by the League of Nations and

adopted in a number of countries. The use of X-rays in industry is being constantly extended. See X-Rays.

Radiometer (Lat., *radius*, ray; Gr. *metron*, measure). Name given to an instrument invented by



Radiometer invented by Sir W. Crookes

Crookes to show motion caused by the action of light. It consists of a windmill with four metal vanes, each brightly polished or silvered on one side and blackened on the other. The four supporting arms are carried on a delicately pivoted vertical rod, and the whole apparatus is enclosed in a high vacuum. When placed in the light the windmill revolves with a speed depending upon the intensity of the light. The action is probably due to the difference of temperature of the blackened and silvered sides, the former absorbing more heat rays from the light and reacting on the molecules of the rarefied gas left in the vacuum.

The term radiometer is also applied to instruments which actually measure the intensity of the incident radiation by the rise in temp. of a blackened disk exposed to the radiation.

Radio-Micrometer. Instrument combining the properties of a thermocouple and a galvanometer. It is used to detect and measure feeble radiations, such as those emanating from astronomical bodies. The two elements of a thermocouple have their lower ends soldered to a blackened silver disk, which receives the radiations.

The upper ends of the elements are joined by a silver wire from which is suspended a quartz fibre carrying a galvanometer mirror. The thermocouple is placed in the centre of a thick iron block set inside a copper block, the end of which is carried up into a thick tube surrounding the suspended loop. This loop is placed between the poles of a magnet to form a moving-coil galvanometer of one turn. When radiations fall on the disk a rise in temperature occurs at the lower junction of the couple, inducing a thermo-electric current in the loop. This causes a movement of the quartz fibre and the mirror, and an indicator on a scale registers the strength of the radiation. See Galvanometer; Thermocouple.

Radio Sonde. Meteorological instrument which can be attached to a free balloon and transmit by radio signals representative of the temperature, pressure, and humidity during ascent. The transmissions are picked up by a radio receiver on the ground. Normally it is possible by this method to obtain information automatically up to heights of about 10-12 m. and at ranges exceeding 100 m. The balloon is inflated with hydrogen until it will lift the radio sonde at a rate of about 1,000 ft. per min.; as the balloon rises the external atmospheric pressure gradually diminishes, causing the balloon to expand until at bursting point its original diameter of about 6 ft. may be doubled. A parachute is included to break the fall, allowing the instrument, if recovered, to be used again. As the radio sonde makes upper air observations available almost immediately, the meteorologist receives a three-dimensional picture of the atmosphere. The device was introduced in France in 1927 by Idrac and Bureau.

Radio-therapy. Treatment of disease (e.g. cancer) by radio-active substances, i.e. radium, radium emanation. X-rays, etc. See Radium; X-Rays.

Radio Times. Weekly journal published by the B.B.C. Its main function is to print details of all B.B.C. programmes for seven days, together with explanatory reading matter and general information of the corporation's activities. It originated through the temporary refusal of newspapers in 1923 to continue printing B.B.C. programmes except at advertisement rates, and the first number appeared Sept. 28, 1923. Until 1936 it was

printed and published for the B.B.C. by the firm of George Newnes and Co., Ltd., but from 1937 it was printed in works specially built for the purpose by Waterlow and Sons, Ltd. As most of the programme information contained in the journal is unobtainable elsewhere, the circulation steadily increased with the popularity of broadcasting, and by 1950 had reached a weekly average of over 8,000,000 copies.

Radio Valve. For a description and explanation of its various forms see Thermionic Valve.

Radish (Lat. *radix*, a root). Genus of annual and biennial herbs of the family Cruciferae and genus



Radish. Bunches of two cultivated varieties of the vegetable

Raphanus. The garden radish (*Raphanus sativus*), whose native country is unknown, was introduced to the British Isles in 1548. Radishes prefer a light, rich soil, and thrive best in one which has been heavily manured for previous crops. Hence, when grown on a large scale, they should follow cabbages or other members of the Brassica genus. The first sowing in the open air should be made in March, in a sheltered position, and then, by making successional sowings once every three weeks until Oct., and subsequently in a heated greenhouse, a crop of radishes may be obtained all the year round.

The seed must be sown very thinly, as if planted too closely the roots will be hot in flavour and stringy. The long-rooted radishes are the best for early or spring sowing, and the round or turnip radishes for summer treatment.

Radium (Lat. *radius*, ray). One of the chemical elements. Its chemical symbol is Ra, atomic weight 226, atomic number 88, melting point 700° C. (1,292° F.). Discovered by Pierre and Marie Curie in 1898, it was isolated in 1910 from radium chloride. It is a silver-white metal, which tarnishes rapidly on contact with air.

It is found in all mineral ores containing uranium, the proportion between the content of the two metals being always the same, 3,200,000 of uranium to one of

radium. The chief radium-bearing ores of practical value are uranite, carnotite, pitchblende, gummite, curite, and torbernite. These occur in Bohemia, Cornwall, Colorado, S. Australia, and especially Katanga in the Belgian Congo, and the Great Bear Lake, Canada. The metal is in reality widely distributed throughout the earth, and may even exist in minute quantities in the human body.

Barium is its closest ally, and the two form analogous salts—bromides, chlorides, sulphates, carbonates, etc.—all far more stable than the metal. Radium and its salts are remarkable for their radio-active properties. (See Radio-activity.)

RADIUM THERAPY. Following the discovery of radio-activity and the isolation of radium salts by the Curies, research into the effects of radium rays on plant and animal tissues was undertaken. Histological findings in irradiated normal animal tissues were carefully tabulated and the effects on diseased tissue correlated. The destructive effect of radium rays was demonstrated by the occurrence of severe burns on the skin following the application of the element. From this developed its use, within restricted limits, in dermatological disease, and occasional cure of surface cancer was demonstrated. Deep cancers were unaffected by surface radiation. Later, improvement in the technique of application and especially of filtration of the rays, led to success in the treatment of deeper seated lesions.

During the early part of the 20th century another method of radium application involved the exposure of deep seated disease by surgical operation and the insertion of radium, enclosed in tubes, into the tumour. The radium tubes were removed after a certain interval of time. Many successes were reported as a result of this method, from which originated interstitial radium needling of malignant tumours. Radium packed into body cavities (e.g. the uterus, maxillary antrum, etc.) led to marked success in the treatment of disease in these regions. The effects are due almost entirely to the gamma rays of radium. As a rule the greater the malignancy of the tumour the more sensitive it is to the action of these rays.

In internal medicine radium is useful in certain blood diseases, e.g. leukaemia, while in generalised conditions, such as Hodgkin's

disease, lymphosarcoma, and generalised carcinomatosis, radium treatment affords palliation. Certain acute and chronic inflammatory diseases and many forms of skin disease can be treated.

Radium rays have a selective action on cells undergoing active and rapid division, such cells, which comprise the cancer growth, being destroyed by doses of radiation smaller than those harmful to normal cells. The ultimate mode of action on the cell is not known, but the cells are altered so that mitosis and reproduction cease, and the surrounding defensive and recuperative mechanism is strengthened.

Dosage in and application of radium therapy have to be very carefully controlled. Overdosage is disastrous in that normal tissue destruction results in severe radium burns which it is almost impossible to heal. Also the effect of overdosage upon the blood-forming mechanism leads to severe anaemia of the aplastic type which always results in death. As those who administer radium treatment are also liable to suffer ill-effects from the rays, in many countries the conditions of such work are regulated by law.

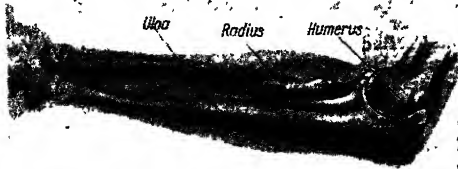
In Great Britain and the U.S.A. radium institutes exist for radium supply, investigation, and medical treatment. The address of the Radium Institute is 1-3, Ridinghouse Street, W. See Radio-activity; Radon; consult Chapters in the Chemistry of the Less Familiar Elements, B. S. Hopkins, 1940.

Radius. Outermost of the two bones of the forearm. It articulates at its upper end with the humerus and the ulnar and at its lower end with the scaphoid and lunar bones of the wrist. The upper extremity or head is disk-shaped, and has a depression in the centre which articulates with a protuberance on the humerus. At the side of the disk is the articular surface which rotates in the small sigmoid cavity of the ulna. On the upper part of the shaft of the bone is a rough tuberosity to which is attached the tendon of the biceps.

The muscles attached to the shaft are the flexor sublimis digitorum, the flexor longus pollicis, the pronator quadratus, extensors of the thumb, the pronator teres, and the supinator brevis. The lower extremity has a large surface for articulation with the wrist, and, on its inner side, a small surface which articulates with the ulna. A protuberance,

felt on the outer side of the wrist, is known as the *stiloid process*. When the arm is held in the position of supination, i.e. with the palm facing forwards, the radius is parallel to the ulna. When the arm is turned into the position of pronation, i.e. with the back of the hand facing forwards, the radius is crossed over the ulna.

Dislocation of the radius, which usually results from a fall on the hand, is most frequently in the



Radius. Diagram illustrating relative positions of bones of the forearm

forward direction, the head of the radius coming to rest against the lower end of the humerus. Reduction is effected by pulling on the wrist with the forearm bent at a right angle, pressure over the head of the bone being applied at the same time. Following reduction the arm should be kept at rest for several weeks.

Fracture of the radius may occur at any part of the bone, but is most frequent at the lower end, being usually due to a fall in which the hand is stretched out palm downwards to break the fall. This is known as *Colles's fracture* (q.v.). See Arm.

Radius (Lat., rod, ray). In geometry, name given to the distance of the circumference of a circle or the surface of a sphere from their centres. The radius of a taxi is, in London, a distance of 6 m. from the point of hiring; beyond this distance the driver can no longer be compelled to accept the terms shown on the meter. The geographical radius within which a taxi may ply for hire varies with the local authority granting the licence.

Radius Vector. In astronomy, name given to the line joining the position of a planet at any point in its orbit to the sun. Since the planetary paths are ellipses, the length of the radius vector varies, and the shorter it becomes the faster the planet moves. This fact is stated in Kepler's second law, that the areas described by the radius vector of a planet in its orbit are proportional to the times taken in describing them.

Radlett. Village of Herts, England. It is 5 miles S. of

St. Albans on Watling Street, and 15 m. by rly. N.W. of London. Wholly built since 1850, it is part of the ancient parish of Aldenham, and has become largely a residential area for Londoners. Pop. est. 5,000. The Radlett airfield is owned by Handley Page Ltd., and has been the main site of the experimental work carried out by that firm.

Radley. Village of Berkshire, England. It stands on the Thames, 4 m. by rly. S. of Oxford. S. John's Church is a modern building, and the hall, once the seat of the Bowyer family, is now part of the college which was founded here in 1847, its full

name being the College of S. Peter. It is a Church of England school, incorporated by royal charter in 1890, and has about 400 boys. A memorial gateway has been erected, inside the double arches of which are inscribed the names of boys and masters who fell in both Great Wars. Pop. est. 1,000.

Radnor. N.W. Village of Radnorshire, Wales. It stands on the river Somergill, 7 m. S.W. of Presteigne, with a rly. station. At one time a place of some size, it was incorporated in 1561, and

Radnor, EARL OF. British title borne in turn by the families of Robertes and Pleydell-Bouverie. John Robertes, Lord Robertes of Truro (1606-85), was created earl in 1679. He had been a leading man on the parliamentary side during the Civil War, but was afterwards among the supporters of Charles II, under whom he was lord-lieutenant of Ireland, lord privy seal, and lord president of the council. The title became extinct on the death of the 4th earl, unmarried, in 1757. The estates, however, passed to relatives, and after a time to Thomas James Agar-Robartes, Baron Robertes (1808-82), whose grandson, the 3rd baron, became Viscount Clifden in 1930. The family has long been settled in Cornwall, Lanhydrock, near Bodmin, the old seat of the earls, being their property.

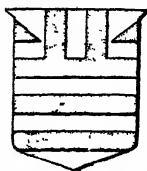
The second family of earls began with William Bouverie, Viscount Folkestone (1725-76), the descendant of a rich merchant of Huguenot descent. He was made earl of Radnor in 1765. His son took the additional name of Pleydell on inheriting wealth from his maternal grandfather, and subsequently the family name was Pleydell-Bouverie. From him the later earls are descended. William, 7th earl (b. Dec. 18, 1895), who succeeded to the title in 1930, owns much land at Folkestone, and his chief seat is Longford Castle, Wilts. His eldest son is called Viscount Folkestone.



Radnorshire. Map of this inland county of Wales

retained its municipal privileges until 1883. There are remains of its castle, and part of the guildhall. About 3 m. to the S.E. is the village of Old Radnor. The waterfall Water-break-its-neck is 3 m. to the W. of New Radnor. Pop., estimated, 500.

Radnorshire. Inland co. of Wales. Its area is 471 sq. m. In the E. and S. it is fairly level, but the rest of the shire is hilly. The valleys contain picturesque and attractive scenery. The wild district in the centre of the county is known as Radnor Forest.



Radnorshire arms

The principal river is the Wye; others are its tributaries, the Elan, Lugg, Arrow, and Ithon.

The Elan supplies Birmingham with water. Radnorshire is a centre of agriculture, and oats and wheat are grown and sheep are reared, while about half the land is under permanent pasture. The county unites with Brecon to send one member to parliament. Presteigne is the co. town; others are Knighton, Rhayader, and Llandrindod Wells. In early times Radnorshire formed the district of Maesyfed, one ruled by the lords marchers after the conquest of Wales by Edward I. Its most notable ecclesiastical building was the rich Cistercian abbey known as Cwmhir. In 1536 it was made a shire on the English model, taking its name from Radnor, then an important place. Pop. 21,323.

Radom. Town of Poland and capital of a dist. of the same name in Kielce co. It stands on the river Mlechna and on the rly., about 60 m. S. of Warsaw. It has normally a trade in cattle, and tanning and distilling are important industries. In the First Great War the Austrians, defeated by the Russians at Ivangorod on Oct. 23, 1914, fell back on Radom, where a three-day battle developed and ended with the Russian occupation of the town. Radom was retaken by the Austrians in July, 1915. The town was overrun by the Germans in Oct., 1939, and remained in their hands after the Russian-German partition. It was taken by the 1st White Russian Front on Jan. 16, 1945. Pop., 1939, 77,900.

Radon. The heaviest known gas, atomic wt. 222, set up by the loss of helium from radium through disintegration; atomic No. 86. Known also as radium emanation, it belongs to the series of "noble" or chemically inert gases, which include neon, argon, and krypton. It is readily absorbed by charcoal and water, has a distinctive spectrum, and itself decays at a rapid rate to form radium A, which in turn disintegrates to form radium B, and so on up to radium

F, all of which substances form the so-called radio-active deposit. The state known as radium equilibrium occurs when the formation of radon reaches a maximum with corresponding changes down the series. It takes approximately 30 days to reach this peak of activity. The final product of the series is radium G, which emits no rays and is an isotope of lead. See Radio-activity; Radium.

Radstock. Part of the urban district of Norton-Radstock, Somerset, England. A market town, it is 16 m. S.S.E. of Bristol, and has rly. stations. The chief industry is coal mining, the town being the centre of the Somerset coalfield. Market day, Sat.

Radziwill, CATHERINE, PRINCESS (1858-1941). An American writer. Daughter of a tsarist officer of Polish birth, she was born at St. Petersburg (Leningrad), March 30, 1858, and at 15 married Prince Charles Radziwill, of a family descended from Frederick the Great. In Berlin she became a leader of aristocratic society. After her husband's death she married Louis Kolb-Danvin, and later went to the U.S.A., where she became naturalised and died, May 11, 1941. On European politics and court life, she wrote *Germany under Three Emperors*, 1917; *Intimate Life of the Last Tsarina*, 1928; *The Taint of the Romanovs*, 1931; *It Really Happened*, 1932.



Princess Radziwill, American writer

Rae, JOHN (1813-93). British explorer. Born in the Orkneys, Sept. 30, 1813, he studied medicine in Edinburgh, and in 1833 was appointed a surgeon in the Hudson Bay Company's service. In 1846-47 he undertook the exploration of the Committee Bay and a search for Franklin. In 1850 he made another attempt, and, combining survey with his search for the lost explorer, charted 700 miles of new territory. In 1853 he completed the survey of the W. coast of Boothia, and, incidentally obtaining definite news of Franklin's



John Rae, British explorer

death, earned the £10,000 reward offered for that information. Between 1858 and 1864 Rae made other Arctic voyages. He lived until July 24, 1893.

Rae Bareilly. Dist. and town of the Uttar union, India, in the Lucknow division. The dist. has the Ganges in the S.W. and Lucknow dist. on the N. The annual rainfall is 38 ins. Rice, wheat, and millet are the chief crops. The town is in the middle of the dist. and is a rly. junct. Area, 1,765 sq. m. Pop., dist., 1,064,804; town, 18,500.

Raeburn, SIR HENRY (1756-1823). Scottish portrait painter. Born at Stockbridge, near Edinburgh, March 4, 1756, he was apprenticed to a goldsmith in Edinburgh. He soon began to paint water-colour miniatures of his friends, and, after studying with David Martin, passed



Sir Henry Raeburn, Scottish painter
Self-portrait

to portraiture in oils. In 1778 he married Ann Leslie, a widow with means. On the advice of Reynolds, he set out for Italy in 1785, and, having worked for two years in Rome, returned to his profession at Edinburgh. He painted most of the notable Scotsmen and Scotswomen of the day, his style being direct, crisp, vigorous, and masculine. His portrait of Dr. Nathaniel Spens, perhaps his masterpiece, is in the Archers' Hall, Edinburgh, and both the Edinburgh National Gallery and Portrait Gallery are rich in his works. The portraits of Mrs. James Campbell, Sir Walter Scott, and Sir John Sinclair may be noted. He was elected A.R.A. in 1814 and R.A. in 1815; knighted in 1822; and in 1823 became the King's limner for Scotland. He died in Edinburgh on July 8 of the same year. *Consult* Lives, W. R. Andrew (his grandson), 1886; Sir W. Armstrong, 1901; E. R. Diddin, 1925; Sir H. R., W. E. Henley, 1890; and the essay in R. L. Stevenson's *Virginibus Puerisque*.

Raeder, ERICH (b. 1876). German sailor. Son of a teacher, he was born at Wandsbek, April 23, 1876, and entered the navy in 1897. He served in William II's yacht, 1910-12, and became chief of staff under Hipper at the beginning of the First Great War, taking part in the Dogger Bank and Skagerrak battles, and commanding the cruiser Köln in 1918. In 1925 he commanded the Baltic sea



Admiral Raeder,
German sailor

naval forces until superseded by Doenitz in 1943, when he remained inspector-general of the navy. Tried as a war criminal at Nuremberg in 1946, he was sentenced to prison for life.

Raemaekers, Louis (b. 1869). Dutch cartoonist. Born at Roermond, Holland, April 6, 1869, he studied at Amsterdam and Brussels. In 1908 he started drawing political cartoons, and won international fame early in the First Great War for his scathing satires on the Germans. These appeared first in the Amsterdam *Telegraaf*, and were reproduced regularly in many Allied countries as expressing the sympathy of a neutral.

Rafa. Town on the Egyptian side of the Palestine-Egypt frontier. It lies 20 m. S. of Gaza, on the Mediterranean coast, and 30 m. from El Arish (q.v.). It is notable for a battle of the First Great War fought near here between a British desert column (New Zealanders, Yeomanry, and the Camel Corps, with artillery) under Sir P. Chetwode, and Turks, Jan. 9, 1917, during the British advance into Palestine. Though Rafa gave its name to the battle, the real struggle took place at Magruntin, Rafa being captured by the British.

Raff, Joachim (1822-82). Swiss composer. Born at Lachen, Schwyz canton, May 27, 1822, he studied science, but turned to music, being early encouraged by Mendelssohn. Closely associated with Liszt from 1850, he was an enthusiastic supporter of Richard Wagner, publishing a book, *Die Wagner-Frage*, in 1854. He settled in Wiesbaden, 1855, became director of the conservatoire of Frankfurt-on-Main, 1877, and died there June 24, 1882. Among his numerous works are violin concertos and sonatas, several operas, and the programme symphonies *Im Walde* and *Lenore*; but his place in the affections of a wide public is chiefly due to a tuneful little composition, *Cavatina*.

Raffaellino della Colle (1490-1566). Italian painter. He was born at Colle in Tuscany, and studied under Raphael, whom he

helped in the Vatican and Farnesina palaces at Rome. Later he became a pupil of Giulio Romano (q.v.). His principal works are a *Resurrection* and an *Assumption*.

Raffia Work. The manufacture of a variety of articles from bast dyed in different colours. Raffia has long been used in kindergarten and other schools for young children as a good and inexpensive medium for manual training. It is usually obtained ready dyed. It is damped slightly and is then twisted on a board cut in the shape of the required object, or it may be plaited and used to make various articles.

When raffia is used for coarse but very effective embroidery, it is more satisfactory for the workwoman to dye the raffia herself to the exact colours required. Sometimes raffia is used as any other thread would be used, and embroidered straight on to the material; in other cases motives in raffia work are first made and then applied to the material in the same way as in other appliqué work.

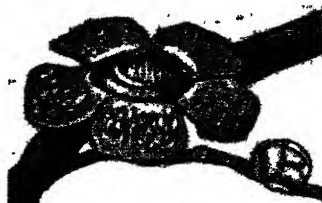
Raffle. For the legal position in regard to raffles, see *Lottery*.

Raffles, A. J. Character featured in various books by E. W. Hornung (q.v.). First appearing in *The Amateur Crackman*, 1899, Raffles was probably the first fictional criminal to be acceptable as a hero to English readers. Playing impeccable cricket for the Gentlemen at Lord's, and burgling country houses at night, he was, in the opinion of most readers, the most convincing of all the "gentlemen burglars" of fiction. His success in books led to both stage and screen versions of his adventures, Gerald du Maurier played the stage part, 1906, and Ronald Colman in a film version.

Raffles, Sir (Thomas) Stamford (1781-1826). British administrator. He was born at sea, off the coast of Jamaica, July 5, 1781, and in 1795 entered the service of the East India Company. Ten years later he was sent to Penang, where he acquired great proficiency in the native languages.

In 1811 he was made lieutenant-governor of Java, a position which he occupied with distinction until the cession of the island to Holland in 1816. In 1818 he became governor of Bencoolen, Sumatra, and by his advice Singapore was acquired by the East India Company, 1819. He proceeded thither in 1822 to establish a government. He died July 5, 1826, two years after returning to England. While in the East, he made extensive scientific observations. His biographies include those by R. Coupland, new ed. 1946; E. Hahn, 1948.

Rafflesia. Genus of leafless and stemless parasites of the family *Rafflesiaceae*. They are natives of



Rafflesia. Flower of *R. arnoldi*, the leafless and evil-smelling parasite

the East Indies. The vegetative portion of the plant consists of threads, like the mycelium of a fungus, in the tissues of species of vines and figs, the only external evidence of its presence being afforded when the huge flower-bud breaks forth. The first species discovered, by Dr. Arnold and Sir Stamford Raffles in 1818, was *R. arnoldi*, 18 ins. across the opened flower. It is very succulent, and the petals, etc., vary from a quarter to three-quarters of an inch thick,



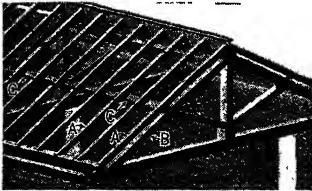
Raft. An inflated rubber raft capable of holding 100 men and weighing 79 lb. Top, a ship's wooden raft

and have reddish tint, and a smell like carrion which induces flies to fertilise it.

Raft (mid. E., spar, rafter; cf. Gr. *orophos*, roof). Collection of pieces of timber fastened together for support on water. It is used

for planks sent down to their destination by being allowed to float down a river. A raft bridge is a bridge supported on rafts, and a raft port is a square hole which some ships have for loading and unloading timber. Rafts are also carried on ships as part of their life-saving equipment. These are usually fitted with air canisters to give them greater buoyancy, while warships carry large oval rafts having floats filled with kapok (*q.v.*). There are also types of inflatable rubber rafts.

Rafter. One of the timbers fixed up the slope of a roof and supporting the tiling or slating



Rafter. Arrangement of rafters in a converted barn. Top, examples of the common rafter (A); principal rafter (B); and a purlin (C)

battens. Rafters are nailed at the feet to the wall plate, and at the head against the ridge. Intermediate support may be provided on horizontal beams called purlins. On house roofs rafters are usually 4 ins. \times 2 ins., spaced at 14 ins. apart. Principal rafters are the sloping members of a roof truss or principal, on which purlins are supported. These may be of timber, steel, or reinforced concrete. See Building.

Ragaz. Watering-place of Switzerland, in the canton of St. Gall. Situated at the entrance of the narrow valley of the Tamina, 31 m. S.S.E. of St. Gall and 1½ m. from Pfäfers (*q.v.*), it has various baths fed by the mineral waters of Pfäfers, a kursaal, etc. Some 30,000 invalids annually have visited the resort. The resident pop. is less than 2,200.

Ragged Robin. Name given to the pink campion. See Campion.

Ragged School. Name given to free schools for poor children



Ragged School. The Nelson Street (Camberwell) Ragged School in 1883

established by philanthropists early in the 19th century in Great Britain. The movement had its counterpart in Germany about the same time. Among the pioneers were T. Cranfield in S. London (1810). John Pounds (*q.v.*) at Portsmouth, and Thomas Guthrie (*q.v.*). A free school where the children were also fed was opened in Aberdeen in 1841, and the Field Lane Refuge in London, 1843. In the following year the Ragged School Union was founded to co-ordinate various charitable agencies for the care and instruction of the destitute poor, and of outcast and crippled children in particular. Day and night schools and Sunday schools were established. In 1914 the title was changed to The Shaftesbury Society and Ragged School Union. See Sunday School.

Raglan. Village of Monmouthshire, England. It is 7 m. W.S.W. of Monmouth, with a station on

the line against the Welsh, was replaced in the 14th century by a more massive structure. In 1646 it was defended for ten weeks against the parliamentarians, after which it was surrendered and dismantled. S. Cadoc's church has memorials of the Somerset family. Pop. 600.

Raglan, FITZROY JAMES HENRY SOMERSET, 1ST BARON (1788-1855). British soldier. A younger son of the 5th duke of Beaufort, he was born Sept. 30, 1788. Educated at Westminster school, he entered the army in 1804 and during the Peninsular War served on Wellington's



1st Baron Raglan, British soldier

staff. At Waterloo he lost a hand. After the war he was secretary to the British embassy in Paris, and sat in parliament for Truro, 1818-20 and 1826-29. From 1827 to 1852 he was military secretary to Wellington, whom he succeeded as master-general of the ordnance. Made a baron, Raglan in 1854 went out in command of the force sent to the Crimea. His conduct of the campaign was not free from blame, but he finished as a field-marshal and remained in charge until his death, June 28, 1855. (See Crimean War.) He gave his name to a style of overcoat sleeving. Raglan married a niece of Wellington, and his son, Richard (1817-84), became the 2nd baron. The 3rd baron, George (1857-1921), was governor of the Isle of Man, 1902-19. His son Fitzroy (b. June 10, 1885) succeeded him in the title and was known as an anthropologist.

Ragman Roll. Corruption of Ragimunde's Roll, a record of information regarding the benefices of the Scottish clergy, compiled for purposes of papal taxation by a papal legate named Ragimunde. Later the term was transferred to the rolls of parchment recording



Raglan, Monmouthshire. The main gateway of the ruined castle

the rly. from that town. Above the village stands the extensive and imposing ruins of Raglan Castle. Including a gateway and remains of the hall and towers, they give a good idea of the nature of a feudal stronghold. The first castle, built here by the Normans as a protec-

the acts of homage made to Edward I at Berwick in 1296. This document, a valuable source of information on the state of Scotland, was published by the Bannatyne Club in 1834.

Ragnarok. Norse name for the Götterdämmerung (*g.v.*) or Twilight of the Gods.

Ragout (Fr.). Highly seasoned relish, made of vegetables, truffles, sweetbreads, mushrooms, etc., and served with any savoury dish. Less correctly the name is given to a highly seasoned stew of mutton or other meat that has been cooked before. *Pron.* rag-oo.

Rags. Scraps and waste pieces of textile materials. New rags, *e.g.* the clippings from tailoring factories, return quickly to commerce. Cotton and linen rags of value in paper-making are separated forthwith from woollens, as are the pocketings and linings of woollen clothing. Rags eligible for remanufacture into woollen cloth are carefully graded according to their kind and colour. Some other rags are converted into a type of manure used in hop-growing.

Drying is the first process in manufacturing from rags. The expulsion of moisture facilitates the removal of dust by a machine in which the rags are whirled and beaten. After being oiled to minimise the breakage of fibre, the rags are disintegrated in a grinder, or devil, into which they are delivered by a travelling apron. Feed rollers grip the rags, and the hardened steel spikes of a revolving drum tear the woven fabric and throw the fibre forward, while any untorn cloth is automatically returned to the front by a fan-wheel and pins or other steel objects are removed by magnets. The woven structure is broken up, but threads remain imperfectly opened, and are separated into fibre in subsequent opening machines or upon the carding engine. *See* Shoddy.

Ragtime. Style of music, derived from the American negro's natural Blues (*g.v.*) in an attempt to present that style in a manner more palatable to the white man's ear. It is characterised by gaiety and vivacity, and its marked use of syncopation. The earliest published examples were Tom Turpin's Harlem Rag and Scott Joplin's Maple Leaf Rag, both 1896. The syncopation consists of stressing the second and fourth beat of the bar (in common time); and by fluctuation of accents and tied notes the music moves in a jumpy or ragged manner instead of flowing easily and steadily.

Ragtime took a good deal of its structure and material from the march, which accounts for its immediate popular appeal, an appeal which lasted in the U.S.A. until the end of the First Great War, although from 1911 onwards the jazz (*g.v.*) style was advancing and incorporating ragtime in its formation. Composing of good piano ragtime had virtually ceased by 1910. The earlier "rags" were never published in the U.K., which may account for the revival of interest in Dixieland music in the U.K. some 50 years later, with the adaptation of piano ragtime for orchestration.

The chronological order of the various negro styles adopted for the entertainment of white people may be stated very roughly as minstrelsy, coon songs, ragtime, jazz, and swing. The Chicago World Fair of 1893 was responsible for that popularising of negro dances which led to the introduction of the cakewalk, bombershay, and pasamala, all dances of African origin. These, in diluted form, became the foxtrot, the charleston, and all the numerous variants of these down to the jitterbug (*g.v.*).

The influence of ragtime on the work of serious composers may be recognized in Debussy's *Golliwog's Cake Walk* and *Minstrels*; Stravinsky's *Ragtime* for eleven solo instruments, and *The Soldier's Story*; Hindemith's *Chamber Music No. 1* (op. 24). Earlier there was Dvorak's *New World* symphony, based on themes from negro melodies, as were his *Nigger quartet* (op. 96) and *E Flat string quintet* (op. 97). The first, third, and fourth movements of the quartet are explicit syncopated rhythm, and suggest characteristics of early ragtime.

Rex Harris

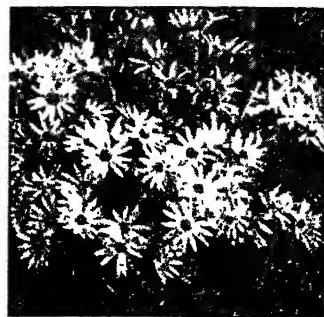
Ragusa. Town of Sicily, in the prov. of Ragusa. It stands among hills at an alt. of 1,630 ft. overlooking the river Ragusa, 3 m. N.W. of Modica and 32 m. W.S.W. of Syracuse. The neighbouring rocks contain caverns with ancient tombs. Ragusa has been identified by some with the ancient Hybla Heraea, and by others with Ina. Manufactures include cotton and woollen goods. British and Canadian troops seized the town from the occupying Germans on July 12, 1943. Pop. 49,530.

Another Ragusa, on the Adriatic Sea, is now generally known by its Yugoslav name of Dubrovnik (*g.v.*).

Ragwort (*Senecio jacobaea*). Perennial herb of the family Com-

positae. It is a native of Europe and Asia. It has leafy stems about 4 ft. high, with deeply lobed, dark green leaves, and large clusters of bright yellow, rayed flower-heads. The bruised leaves give off an unpleasant odour. It grows by the wayside and, as a weed, in pasture; cattle will not eat it.

The species which flourished on bombed sites in London in the 1940s was a hybrid between *S. squelidus*,



Ragwort. Flower-heads of this wayside plant

transplanted in the 18th century from Sicilian lava fields to Oxford, whence its seeds were carried down the rly. to London, and *S. viscosus*, a groundsel native to S. England.

Rahab. Harlot of Jericho, who hid two spies sent in by Joshua before he attacked the city, and let them out again by a cord from her window on the city wall. The story is told in Joshua 2.

Rahere (d. 1144). Founder of S. Bartholomew's hospital, Smithfield, London. He is said to have come to England from La Perche, in Brittany, during the reign of William Rufus. He took holy orders, and his name appears as that of a prebendary of S. Paul's soon after 1115. Later he made a pilgrimage to Rome, and there contracted malaria. On recovering from this he made a vow to found a hospital for poor men. The story runs that S. Bartholomew, in a vision, ordered him to build a priory also, and selected the site. On Rahere's return to England, the title for the requisite land at Smithfield was granted by Henry I (Rahere being a favourite of his), and the building of the hospital on the site it still occupies was begun in 1123, that of the priory a little later. Rahere was master of the hospital until 1137, when he retired to the priory. He died Sept. 20, 1144. His tomb, upon which lies his effigy, is in the priory church, now known as S. Bartholomew the Great. *See* S. Bartholomew's Hospital.

Rahotep. Egyptian prince of the IIIrd dynasty. The mastaba-tomb of him and his wife Nefert, near Seneferu's pyramid at Medum, discovered by Daninos in Mariette's time, yielded two incomparable painted limestone portrait-statues, 4 ft. high, on stone seats, now in Cairo. A British Museum bas-relief from the tomb portrays Rahotep seated before a table of offerings, with hieroglyphs. *See* Egypt.

Rahu. Dragon or demon of Hindu mythology. It is believed to cause eclipses of the sun or moon.

Raibolini, FRANCESCO. Real name of the Italian painter, Francesco Francia (*q.v.*).

Raichur. District and town of Hyderabad state, India. The district is in the Marathwara division in the S.W. of the state, being adjacent to Bombay and Madras. Nearly the whole of the cultivable area is in use, mainly for native food grains. The rainfall is 22 ins. The Kistna and Tungabhadra rivers form the N. and S. boundaries. Area 6,791 sq. m. Pop. 994,000. The town is centrally situated on the Bombay-Madras rly. Pop. 32,000.

Raid. In international law, a hostile invasion of territory of a state at peace, undertaken without the sanction of any recognized political community. Historic examples are the Fenian Raid, from the U.S.A. into Canada, in 1866; and the Jameson Raid into the Transvaal, 1895-96. Such raiders have no claim to the rights of belligerents at the hands of the country invaded, which may deal with them according to its own laws. The country from which the raid was organized is liable for damages if negligence on its part can be proved. In Great Britain the organization of, or participation in, a raid into a friendly country is a crime under the Foreign Enlistment Act. (*See* Jameson Raid.)

In the military sense a raid is an attack against the enemy by a comparatively small body of men for some local or specific purpose. The trench raids of the First Great War were made to obtain prisoners and so establish the identity of the units engaged in a particular part of the line. The mobile fighting of the Second Great War provided few opportunities for these, and the term raid was more generally applied to attacks on enemy-occupied territory. British commandos raided enemy installations and other vulnerable points; when they attacked in cooperation with the

navy and R.A.F., combined operations raids were spoken of. Large-scale raids were called reconnaissance in force, *e.g.* the British and Canadian attack on Dieppe, Aug. 19, 1942.

In air warfare a raid is an attack by aircraft against an objective behind the enemy's lines, as distinct from air operations in close support of advancing troops and armour. *See* Air Raids.

Raiffeisen, FRIEDRICH WILHELM (1818-88). German economist and founder of agricultural cooperative banking. Born at Hamm on the Sieg, Rhineland, March 30, 1818, he was burgo-master from 1845 at various places; from 1852 at Heddesdorf, near Neuwied, where he died March 11, 1888. In 1847 Raiffeisen established the first agricultural cooperative banks at Heddesdorf and Weyerbusch. They soon found imitators, and within a few years a network of Raiffeisen banks was spread over the country.

Raikes, ROBERT (1735-1811). British philanthropist. Born at Gloucester, Sept. 14, 1735, he



Robert Raikes, British philanthropist

succeeded his father in 1757 as proprietor of The Gloucester Journal. Carrying on this work until 1802, he drew attention to the question of prison reform, but it was his establishment of a Sunday school in Gloucester in 1780 that made his fame, for his venture was the beginning of a nation-wide movement. Raikes died April 5, 1811. His statue stands in the Embankment Gardens, London. A study by G. Kendall appeared in 1939. *See* Sunday Schools.

Rail. Name given to birds of the family Rallidae, distributed over many parts of the world and distinguished by having laterally flattened bodies suitable for passing through dense undergrowth. They are comparatively long in the leg and toes. The tail is short and inconspicuous, the head small, and the beak usually rather long and more or less curved at the tip. In Great Britain the family is represented by the corncrake, coot, water-hen, and water-rail. The last named occurs sparsely in the fens and marshes. The plumage is olive-brown on the upper parts and grey below, and the bird has a conspicuous red beak. It is about 11

ins. long, and is to be found all the year round. It nests among the sedges by the sides of ponds and



Rail. The water-rail, of the family Rallidae, a swimmer and diver that nests in the sedges
W. S. Berridge, F.Z.S.

streams, is a strong swimmer and diver, and flies only when compelled. Three other rails, the spotted, the little, and Baillon's, occur in Great Britain. *See* Coot; Corncrake.

Railax Letter Service. System of postal delivery operated by the G.P.O. and British Railways. The postal packet is conveyed by post office messenger to the appropriate rly. station for dispatch by the first available train, and on arrival at the station of destination is immediately delivered to the addressee by another messenger, provided it arrives during the hours when messengers are on duty. In 1948 the charge was 3s. for 2 oz., and 3s. 6d. for 1 lb. (maximum). Registered letters are not accepted.

Railway Mania. Popular term for the wild speculation in railway shares which took place between 1842-47. The immediate success of the first rlys. induced financiers to project lines even where there was no economic justification, and shares in the companies they floated were eagerly purchased by all classes. Hundreds of fraudulent concerns were formed; uneconomic lines were bought up by company promoters and their shares offered to a gullible public. With the high prices offered for rly. holdings of any description, the shares of honest companies were fantastically inflated. One of the principal promoters and speculators was George Hudson (*q.v.*). Towards the close of 1847 the boom collapsed. A permanent result of the railway mania was that less populous districts were served by lines which otherwise might not have come into existence. *Consult* Facts, Failures, and Frauds, J. Evans, 1859.

RAILWAYS: HISTORY AND TYPES

B. W. C. Cooke, Assistant Editor, *Railway Gazette*

The origin and development of railway systems, with particular reference to that of the U.K., are here described. Methods of traction—steam, electric, Diesel, etc.—are described under Locomotives

The beginnings of the railway system of Great Britain, which was the pioneer in this form of traction, can be traced to mining practice. There is evidence of the use of trucks hauled or pushed over primitive forms of rail in central Europe about 1550, and before the end of the 16th century mining railways had been introduced into England from Germany. In co. Durham a number of lines were built from the pits to the river, one well-known example of which was the Tanfield wagonway the first section of which was constructed in 1671. Iron rails appeared in Cumberland in 1738; previously wooden rails had been used, later covered with iron to reduce wear and facilitate the movement of the wagons or "trams" of coal.

The first all-iron rails, called plate rails, were cast L-shape; an upright portion 2-3 ins. high on one side of each rail prevented the wheels of the truck from leaving the track. Where the railway had to cross an ordinary road, these projections were a source of inconvenience to other traffic and in 1789 William Jessop, of the Butterley ironworks, had the idea of having the projection to hold the vehicle on the track made as part of the wheel instead of the rail, and forming a groove in the plates to take this early form of flange. From these rails developed the forms commonly used.

Earliest Authorised Railways

The early mining railways were private concerns constructed and owned by those interested in the movement of the minerals. The traction was by animal power. Probably the first line authorised by the British parliament, which later insisted on exercising increasingly stringent control over all railway construction and activity, was that from Middleton to Leeds, sanctioned by an Act of June 9, 1758. The first public goods line in the world to be sanctioned by parliament was the Surrey Iron rly., incorporated on May 21, 1801, and opened from Wandsworth to Croydon on July 26, 1803. The first railway to convey fare-paying passengers (March 25, 1807) was the Oystermouth rly., opened about April, 1806, from Swansea to Oyster-

mouth and still surviving as the Swansea & Mumbles rly.; it has been worked successively by horse, steam, and electricity.

At first steam was used for goods traffic only. The Liverpool & Manchester rly., opened Sept. 15, 1830, was the first public railway with all traffic operated by steam traction. Steam railways were opened in the U.S.A., 1830; France, 1832; Ireland, 1834; Belgium, Germany, 1835; Canada, 1836; Russia, 1837; Austria, 1838; Czecho-Slovakia, the Netherlands, Italy, 1839; Switzerland, 1844; Poland, 1845; Hungary, the W. Balkans, 1846; Denmark, 1847; Spain, 1848; Brazil, Chile, Peru, 1851; India, 1853; Norway, Australia (Victoria), 1854; Portugal, Sweden, Turkey, 1856; Argentina, 1857; Luxemburg, 1859; South Africa, 1860; Paraguay, 1861; New Zealand, 1863; Greece, Rumania, Uruguay, 1869; Colombia, Ecuador, 1871; Japan, 1872; Guatemala, 1880; Newfoundland, 1881; Labrador, 1882; China, 1883; Bolivia, 1889; Sudan, 1900.

In 1945 there were some 783,000 m. of railways in the world, of which some 262,000 were in Europe (including the U.S.S.R.), 270,000 m. in Canada and the U.S.A., 86,000 m. in Central and S. America. Some 450,000 m. were state-owned. Twenty-five years earlier, a far larger proportion was in private ownership. Following the First Great War, more and more countries acquired and operated railways in their territories; after the Second, two of the largest privately-owned systems, those of Argentina (26,710 m.) and the U.K. (19,860 m.) passed in 1948 to state ownership.

In Great Britain the length of track, 19,860 m., represents 36,797 m. of single track running lines; in addition, there are 15,815 m. of sidings. Approx. 1,250,000,000 passenger journeys are made yearly; and some 262,000,000 tons of merchandise and minerals (more than half coal) are carried. Train mileage run yearly totals 373,000,000, and there are in use about 20,000 locomotives, 40,000 carriages, and 1,200,000 wagons. Total staff is 635,000 men and women.

During the First Great War, and after it until Aug., 1921, the

great bulk of British railways were under govt. control. Gross revenue increased, because the traffic was very heavy and large successive increases were made in passenger fares and goods rates; but working expenses increased still more, chiefly owing to the payment of higher wages to the employees, and the institution of an eight-hour day. In 1920, while the gross revenue was about double what it was in 1913, the expenditure had increased more than three-fold, and, according to the figures prepared by the railway accountants committee, the total net receipts of the controlled companies from all sources had fallen from £45.6 millions in 1913 to £8.9 millions in 1919, and to less than £6 millions in 1920. The pre-war revenue sufficed to pay an average of about 4 p.c. on the whole capital invested; that of 1920 was less than half required to meet the fixed interest on the debenture and rent charge stocks.

Railways Act of 1921

With the object of restoring the financial stability of the railways, and putting them again on a dividend-earning basis the ministry of Transport was formed by an Act passed on Aug. 15, 1919. One result of its efforts was the Railways Act, which became law in Aug., 1921, and was directed chiefly towards (1) reduction of expenditure by economy in management and administration, and by the elimination of the losses attributed to wasteful competition between the different companies; (2) increase of revenue through higher charges, to the extent necessary to bring the railways to the position of self-supporting commercial undertakings.

The Act provided for the re-organization of the railways in Great Britain by amalgamating them into four groups: (1) *Southern group* (London and South-Western; London, Brighton, and South Coast; South-Eastern and Chatham); (2) *Western group* (Great Western and the railway companies in S. Wales); (3) *North-Western, Midland, and West Scottish group* (London and North-Western; Midland; Lancashire and Yorkshire; North Staffordshire; Furness; Caledonian; Glasgow and South-Western; and Highland); and (4) *North-Eastern, Eastern, and East Scottish group* (North-Eastern; Great Central; Great Eastern; Great Northern; Hull and Barnsley; North British; and Great North of Scotland). In 1923 the grouping was brought

into effect, the sections being named Southern; Great Western; London, Midland, and Scottish; and London and North-Eastern. In addition to the constituent companies named, each group included a number of smaller subsidiary companies.

Public Ownership

On the outbreak of war in 1939 the railways, and also the London Passenger Transport Board (*see* London Transport), again passed under govt. control, which was continued after the cessation of hostilities. Under the Transport Act, 1947, inland transport (other than by air) and port facilities passed into public ownership. The Act established the British transport commission, consisting of a chairman and from four to eight other members of whom at least four were to be full-time members. Boards, known as executives, were established, to assist the commission to discharge its function of providing for the carriage of goods and passengers by rail, road, and canal, and the provision of dock facilities. On Jan. 1, 1948, all the main line railways and most of the smaller lines, as well as the London Passenger Transport Board, passed under the control of the commission. British transport stock to the value of some £1,065,000,000 was issued in compensation to railway and canal stockholders. In place of the four main-line railway company systems, the railways were divided into six regions: Scottish, North Eastern, Eastern, London Midland, Western, and Southern.

THE PERMANENT WAY. To transmit the pressure (which may be as much as 20 tons per sq. in.) from the small area of the wheel in contact with the hard steel rail to the comparatively soft earth which ultimately has to bear the weight, sleepers (to which the pressure is transmitted by the broad surface of the chair, sole-plate, or flat-bottomed rail, and so reduced to about 400 lb. per sq. in.) and ballast are used. The ballast serves the double purpose of spreading the weight over a great area and of holding the sleepers in line and to an even level. Ballast should be of hard angular material, such as broken stone, and the depth required depends on the nature of the soil. It must be porous, and there must be good drainage below it, so that water will not soak into and soften the foundation beneath.

Except in N. America, where weights on individual wheels up

to about 17 tons were permitted, the normal maximum wheel loads are generally restricted to 11 tons. To transmit the heavier loads to the ballast, the Americans use about 3,000 to 3,500 sleepers in their heaviest track to a mile of track; in Great Britain the number is normally 2,112. Wooden sleepers, impregnated with creosote as a deterrent of decay, are generally used. The timber used is softwood (*e.g.*, fir) or hardwood (*e.g.*, oak, jarrah, sal, teak), according to which happens to be more readily obtainable. Steel sleepers are much used on the European continent and in countries where wood is scarce or liable to rapid deterioration. A considerable mileage of the former Midi rly. of France (now part of the S.W. division of the French National rlys.) is carried on concrete sleepers. On the British railways timber shortage led to the testing of reinforced concrete sleepers on all the main lines, and many miles of track in sidings

check rails are added inside the lower rail to take part of the side thrust. Circular curves are now always, where possible, introduced by transition curves.

Steel rails are of two types, bull-head and flat-bottom. The former are carried in cast-iron chairs, the latter on cast-iron or steel sole-plates, or fixed directly to the sleepers by spikes or screws. They are usually fixed with an inward cant of about 1 in 20, the treads of the wheels being correspondingly coned when new. Rail ends are joined together by fishplates—or splice bars, as they are called in America. There is a tendency to use longer rails than formerly, and about 60 ft. is a usual length, though in Germany 30 metres (98 ft. 5 ins.) is standard. In England 120-ft. rails have been laid experimentally. The end-to-end welding of 45-ft. rails has become standard in New South Wales up to 360 ft. and in Victoria up to 225 ft. Since 1933 Delaware and Hudson Railroad of America has welded rails in open track into continuous lengths except where it is necessary to have breaks for junctions and track circuits. On the tube railways of London welded lengths of 300 ft. are standard. It is usual to lay the standard 95-lb. per yd. bull-head rails in 120 ft. welded lengths, and to weld them on the site into lengths not exceeding half a mile.

British and American Tracks

British track differs in design from that used in almost all other countries in the world, as bull-head rails are used, keyed in chairs, in preference to the flat-bottom rails favoured elsewhere. In the U.S.A., main-line flat-bottom sections range in weight from 110 lb. to 152 lb. per yd.; they are carried on heavy steel sleeper-plates, and are held down by a variety of fastenings to sleepers more closely spaced than is customary with the bull-head rail.

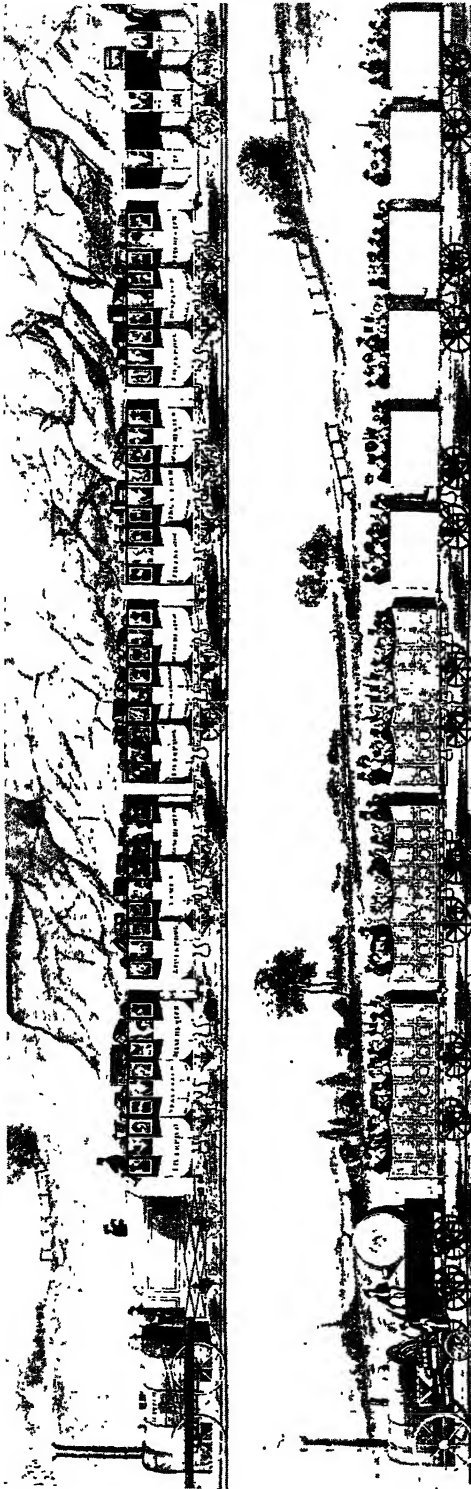
The first tests of flat-bottom rails in Great Britain were made on the L.M.S. rly. in 1936, and in 1939 that company laid the first British flat-bottom track in fast running main lines, with the 110 lb. per yd. British standard, and, later, the 131 lb. per yd. American railway engineering association (A.R.E.A.) standard rail, both of which have the same width of bottom flange. The L.M.S. rly. later adopted the new British 113 lb. rail. In 1943 the L.N.E. rly. initiated a similar large-scale experiment, entirely with the 110 lb. B.S. flat-bottom section,



Railways. Map showing the six regions system operated by British Railways; the boundary lines shown are as revised in 1950, two years after nationalisation

were laid with them. The average weight of a chaired and creosoted wooden sleeper is 237 lb.; that of a transverse ferro-concrete sleeper with two chairs and bolts is 550 lb.

For high-speed main lines curves are not normally made sharper than about half-a-mile radius, and are generally canted to a maximum of 6 ins. Speed is usually restricted on sharper curves. On curves of sharper radius than about 600 ft.,



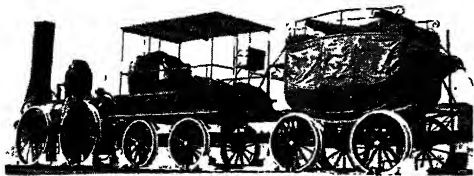
Railways. Passenger trains on the Liverpool and Manchester Railway, opened in 1830. Top, mail train with first-class carriages; beneath, train with second-class and third-class carriages, with passengers completely exposed to the weather
From a print of 1833

and in Jan., 1944, installed the first experimental turnout with this rail. Early in 1946 the G. W. rly. decided to lay lengthy experimental sections with flat-bottom rails of the new British section of 113 lb. per yd., as well as 110 lb. On the Southern rly., also, 113 lb. flat-bottom rails were put into experimental use on lengthy sections of the main line.

The majority of the railways of the world are laid on the standard gauge of 4 ft. 8½ ins. as measured between the insides of the rails, but there are a number of other gauges in use. In India, Ceylon, Spain, Portugal, Argentina, and Chile the 5 ft. 6 ins. gauge is common; in Ireland, South Australia, Victoria, and Brazil the usual gauge is 5 ft. 3 ins.; in the U.S.S.R., 5 ft.; in a number of Australian states, New Zealand, S. and E. Africa, Gold Coast, Nigeria, Sudan, Japan, Sweden, and Norway, 3 ft. 6 ins.; and in some parts of Wales, India, and S. America, 1 ft. 11½ ins.

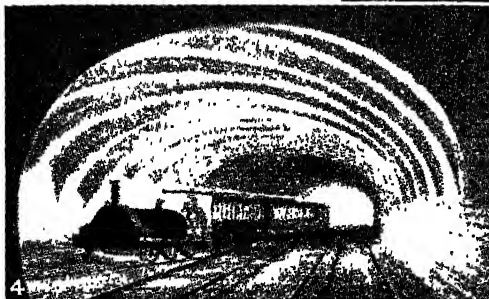
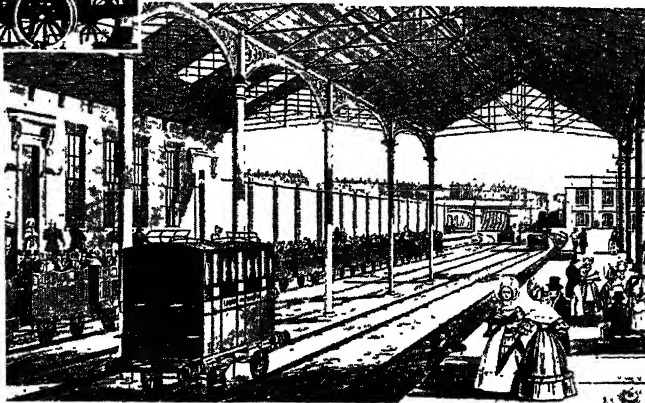
ROLLING STOCK. After the opening of the Liverpool and Manchester rly. in 1830, only first-class vehicles were enclosed to begin with, open thirds lasting until well into the 1850s, and even later on certain branch lines. From open four-wheelers, the railway carriage progressed through the stages of six-wheel enclosed and six-wheel corridors, introduced on the North-Eastern in 1833, to the bogie carriage of today, the first bogie vehicles in Great Britain being the five Pullmans put on the London-Bradford service by the Midland in 1874. These Pullmans were the pioneer buffet cars, but sleeping saloons ante-dated them by two years, being introduced almost simultaneously on the E. and W. coast routes to Scotland in 1873. In 1893 the afternoon express from King's Cross to Edinburgh was vestibuled throughout, the first example of what became universal main-line practice in Great Britain. Third-class diners appeared in 1891, third-class sleeping cars only in 1927.

After 1875, continuous brakes were fitted to British passenger stock, and the Act of 1889, which made such brakes compulsory, was merely intended to bring into line certain recalcitrant railways. Both the vacuum and Westinghouse systems are used. The principle of the vacuum brake is that any deliberate or accidental (e.g. through breaking of the couplings) admission of air at atmospheric pressure into the brake cylinders at once applies the brake blocks on the wheels. When running, the brakes are kept off by the use of a small ejector, which maintains a vacuum in the cylinders and train-pipe. After a stop, when the brakes must be quickly released, a longer and more powerful ejector on the locomotive sucks out the air in a few seconds. As the breaking force depends upon atmospheric pressure (14½ lb. per sq. in.), the cylinders must be very large. The Westinghouse type of brake works by compressed air at 50 to 90 lb./sq. in. pressure, and smaller cylinders suffice. An air-pump on the locomotive compresses the air into a reservoir, from which it is fed, by means of the driver's brake valve, through a triple valve to an auxiliary reservoir beneath each carriage. The valve is merely a three-way valve and when the movement of the driver's handle or the



pulling of a communication cord, or the breakage of the couplings, causes a drop in pressure in the train-pipe, the triple valve moves, and allows air from the auxiliary reservoir to pass to the brake cylinder and apply the blocks through the movement of the piston. Restoring the train-pipe pressure releases the brake.

Improvement in comfort and safety has been achieved only by increasing weight and cost. British main-line vehicles in the mid 20th century scale anything from 30



Railways. 1. Engine and coach of first train in the U.S.A., which ran from Albany to Schenectady, Aug. 3, 1831. 2. Metal railway ticket, Leicester and Swannington Rly., opened July 17, 1832. 3. Interior of Euston station, London, c. 1840. 4. First down train on the Metropolitan Rly., London, passing Praed Street junction, Jan. 10, 1863. 5. Train with uncovered 3rd class carriages, c. 1860

to 35 tons; dining or sleeping cars are usually heavier. Dimensions and weight of typical standard passenger stock are:

	British	Continental	American
Length ..	61 ft. 6 ins.	68 ft. 3 ins.	78 ft. 0 ins.
Height ..	12 ft. 10 ins.	13 ft. 3 ins.	14 ft. 0 ins.
Width ..	9 ft. 3 ins.	9 ft. 7 ins.	10 ft. 4 ins.
Tare weight	30 tons	40 tons	70 tons

An American Pullman all-steel twelve-wheeled car, with 4 to 6 tons of air-conditioning equipment, may weigh complete from 80 to 85 English tons.

The development of passenger comfort in train travel during the 20th century has been very rapid, particularly in the U.S.A. An increasing number of passenger coaches are made of steel sheets, giving strength with lightness, and open lounge, library, bar, and buffet cars are a feature of luxury travel in the U.S.A. Sleeping cars

have been developed to give greater comfort and privacy, and smoking rooms, barbers' shops, bathrooms, typists' rooms, and observation cars giving wide vision of the country are to be found on many railways.

Freightwagons and vans are of many types and capacities. The majority of open wagons used in Great Britain are four-wheeled and are developments of the "wains" used 300 years ago in the colliery railroads. Covered wagons were subsequently introduced to protect goods from rain, snow, etc. The general carrying capacity is 10 to 12 tons, but as older wagons are condemned they are replaced by wagons of larger capacity and there are now many 16 ton wagons and a number of 20 ton wagons in the U.K. In the U.S.A. and

other countries 50 ton and larger wagons are common. Many special types of wagons have been developed to carry special traffic, e.g., oil, milk, bananas, fish; and heating and refrigerating plant is installed in them where necessary.

RACK RAILWAYS. On gradients exceeding 1 in 25 the ordinary kind

of adhesion locomotive is impracticable. Gradients up to 1 in 12 can be climbed, under favourable conditions, by trains of which all the wheels are driven. On steeper grades adhesion is insufficient, and a positive means of haulage is required, the most usual being that afforded by the engagement of driven cogwheels with a rack laid between the running rails and fixed firmly to the sleepers. The rack railway up Mt. Pilatus has an average gradient of 1 in 2½ and a maximum gradient of 1 in 2. This, however, is exceptional, 1 in 4 being generally considered the limit, above which cable haulage is to be preferred.

The racks used are of several kinds. The Strub is a single strong flat-footed rail with large teeth cut in the head, the Riggerbach has a single set of teeth shrouded on both sides; the Abt, two or

more sets so arranged that the teeth are in different lines transversely. The last gives the smoothest running, as at least two rack teeth are always engaged with a driving cog. Various devices are used to prevent the cogs from climbing the teeth of a rack. On very steep gradients the locomotive is always placed on the downhill side of the vehicles it has to move. Brakes act on the cog shafts, and work automatically if the speed exceeds a certain limit. Where electric power is available, it is preferred to steam.

Bibliography. History of Inland Transport and Communications in England, E. A. Pratt, 1912; Permanent Way Material, W. H. Cole, 1920; Evolution of Railways, Charles E. Lee, 1943; Elements of Railroad Engineering, W. G. Raymond, H. E. Riggs, W. C. Sadler, 6th ed. 1948; The Railway Handbook (annual); The Railway Gazette (weekly); The Railway Magazine (bi-monthly).

Raimondi, MARC ANTONIO (c. 1475-1534). Italian engraver, also called Marcantonio. Born at

Bologna, he studied under Francia and later under Raphael at Rome. While in Venice, 1508-10, he copied on copper many of Dürer's woodcuts, which he signed with the



Raimondi,
Italian engraver

latter's mark; Dürer, however, obtained a prohibition against the continuance of this practice. Marcantonio's most famous plate is the engraving after Michelangelo's *The Climbers*; he also engraved after Raphael, Giulio Romano, and Baccio Bandinelli. After the sack of Rome in 1527 he fled to Bologna, where it is presumed that he died.

Rain. Condensed water vapour of the atmosphere falling in drops. When a mass of damp air rises and expands with decreasing pressure, its relative humidity increases until it is saturated; condensation then occurs on the numerous hygroscopic particles present in the atmosphere. If the temperature at this level is above freezing point a cloud of minute water droplets will be formed, which fall so slowly through the air that they can be regarded as in suspension. On further ascent of the air the droplets coalesce, and when they become sufficiently heavy to overcome the upward currents they fall through the cloud, gaining yet

more moisture. Beneath the cloud some evaporation will take place, but eventually the drops reach the ground as rain.

The formation of large raindrops has been attributed to coagulation brought about by collisions between droplets of different sizes (and therefore different relative motions), but another explanation depends upon the presence in the cloud of ice crystals as well as water drops. Then the crystals grow in size as they move downwards through layers of super-cooled water droplets. The great majority of raindrops have diameters of 2 millimetres or less. With a diameter beyond 5 mm. it is impossible for a raindrop to fall intact. See Condensation; Rainfall; Snow.

Rainbow. Name given to the phenomenon caused by the internal reflection and refraction of rays of light in the spherical globules of raindrops. A rainbow is always seen in the part of the sky away from the sun, its height varying inversely as that of the sun, i.e. the higher the position of the sun, the lower the rainbow. The colours of the rainbow are those of the spectrum in the same order, red being outside. Occasionally a second concentric and fainter bow is observed with the colours in the reverse order. Inside the main or primary bow one or two fainter "supernumerary" bows are sometimes visible. The intensity of the colours of a rainbow depends largely on the size of the raindrops. On mountain tops, or from an aeroplane, completely circular rainbows may be seen under favourable conditions. The lunar rainbow is a much rarer occurrence and appears white owing to the inability of the human eye to distinguish colour with weak light. In weather lore rainbows in the evening are regarded as precursors of fine weather



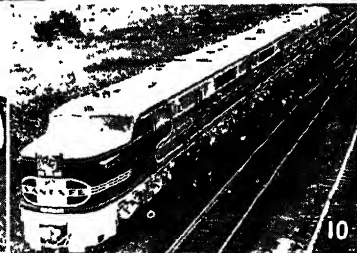
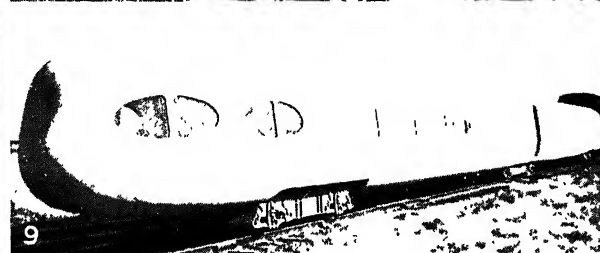
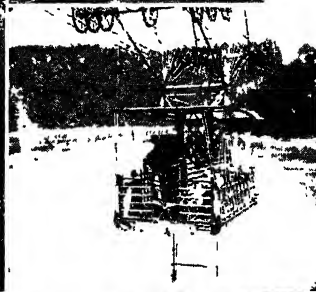
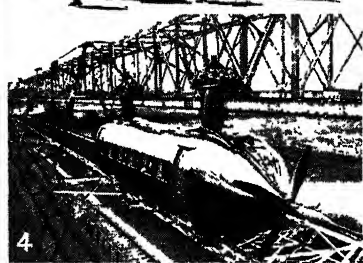
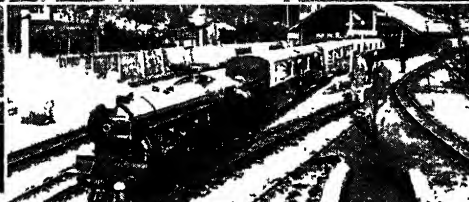
Rainbow. A second and even a third arc may appear if the light is strong
Dr. G. A. Clarke

er the following day, and in the morning of wet weather during the day. The Biblical story (Gen. 9) makes the rainbow the symbol of God's promise never again to inundate the world. See Clouds; Light; Spectroscopy.

Rainfall. General term for precipitation or condensation from the atmosphere, whether in the form of rain, hail, or snow, and to a lesser extent deposits of dew and hoar-frost. Estimates of rainfall are based upon measurements of the moisture collected in rain gauges exposed in such a manner as to be representative of the surrounding terrain. A rainfall of one inch in a certain time implies that if all the rain, or equivalent water, during that time had remained where it fell on a flat surface, suffering no loss by evaporation or percolation, it would form a layer one inch deep. The calculations of rainfall over the land masses of the globe and its variability from day to day, month to month, etc., depend upon measurements from rain gauges maintained by the various meteorological services, cooperating local authorities, and public-minded individuals; in the British Isles values are available each year for about 5,000 gauges constituting a fairly close network.

In addition to the regular official publications of summaries of these data, together with long-period monthly and annual averages, maps are issued showing the isohyets, or lines which indicate equal quantities of precipitation, for each particular month, season, and year. Over the E. and S. of the U.K. the rainiest month is generally Oct.; over the W. and N. it is Dec. or Jan. In some districts most rain falls in July or Aug. owing to the frequency of summer thunderstorms. For the country as a whole April is the driest month. As a rule, from any area of great rainfall the quantity diminishes towards the lowlands, deserts, and places more remote from the sea. Little information is available regarding the distribution of rainfall over sparsely populated areas, polar regions, and oceans.

Water vapour is always present in the atmosphere, warm air having a greater capacity for water vapour than cold air. The study of the causes of the formation of rain entails a study of the processes whereby air is cooled below its saturation temperature. This cooling may be brought about by direct radiation from the air itself, by warm moist air coming into con-

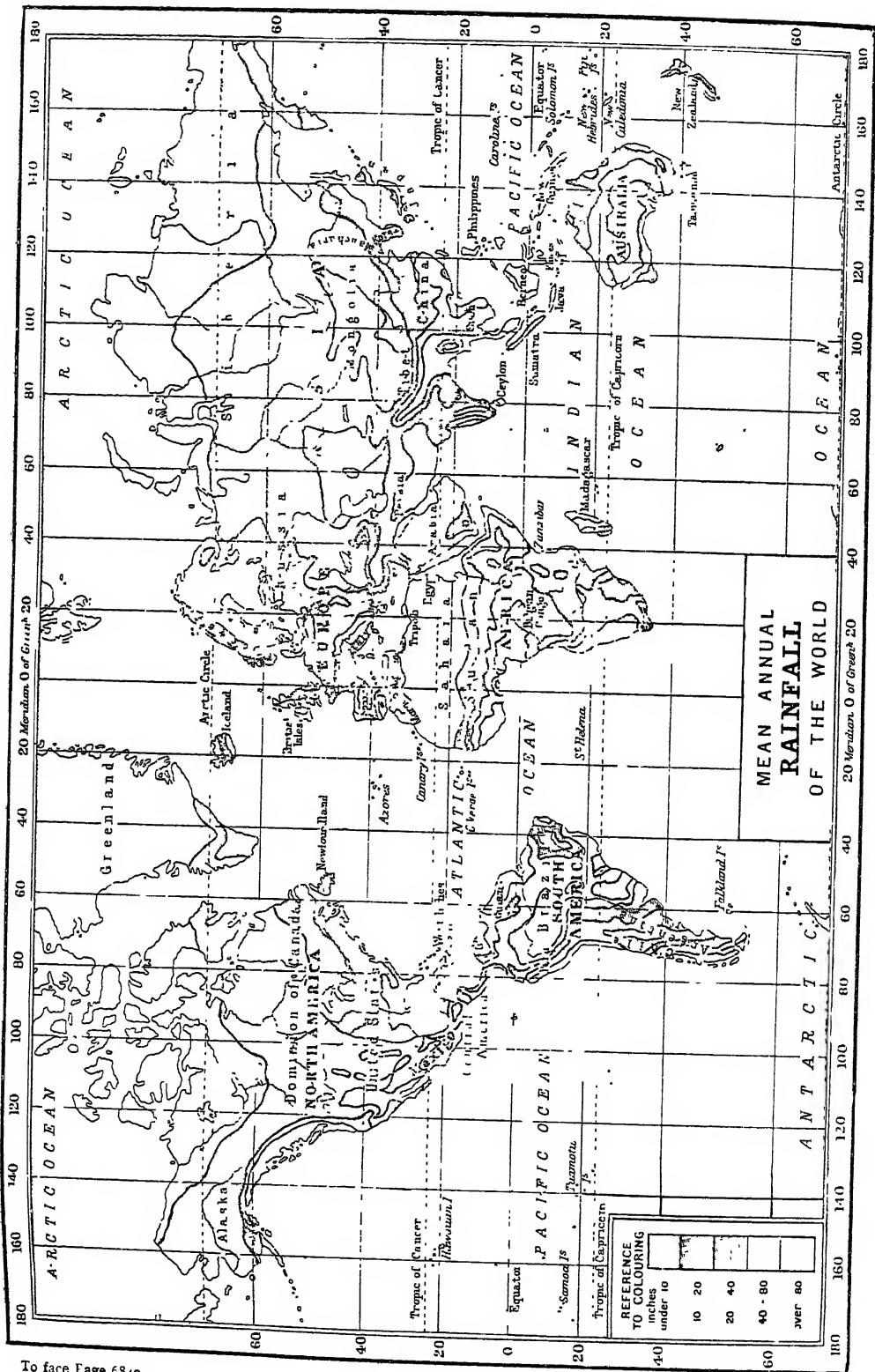


1. Waterloo station, London, a famous British railway terminus 2 The Snowdon mountain railway, Wales, the only one of its kind in the British Isles 3 Train of the world's smallest public railway, the Romney-Hythe-Dymchurch, Kent 4 An experimental type

of propeller-driven railcar 5 A Danish railway bus 6 Mt. Pilatus railway, Switzerland, where cable-operated suspension (7) is also in use 8 Crossing the Whirlpool Rapids over the Niagara river, U.S.A. 9 American streamlined coaches, and (10) Diesel-electric locomotive

RAILWAYS: SOME REMARKABLE TRIUMPHS IN RAILWAY ENGINEERING

Photos: British Railways, For Photos, New York Times Photos, Swiss Federal Rlys





Rainfall. Map showing the distribution of the rainiest regions and the deserts of the world in relation to the season of maximum precipitation and the prevalent winds as indicated by arrows

tact with either a cold land or water surface, or by transportation by winds from warm to colder latitudes, e.g. the damp westerlies; but a large mass of air is cooled most rapidly by ascent, e.g. at a height of 3 m. the atmospheric pressure is only about half that at sea level, and a bulk of air raised to this altitude expands to twice its volume, the energy required to effect the movement of the molecules of air in this expansion being obtained at the expense of heat, which results in a fall of temperature, or adiabatic cooling.

When the temperature of the air is lowered sufficiently to cause condensation, the latent heat liberated counteracts adiabatic cooling to such an extent that, generally, air saturated with water vapour will have to ascend twice as high as unsaturated air if the same fall in temperature is to be achieved (5° F. per 1,000 ft. for dry air). This is an important factor in the production of heavy rain, because damp air which starts to rise, being warmer than its environment, will continue to rise higher than the dry air.

Three types of rainfall are recognized, according to the way in which adiabatic cooling leading to cloud formation is effected. *Convictional* rain is caused by the heating of surface layers of the atmosphere, heavily charged with moisture, which expand and rise, giving place to colder, denser air. Thun-

derstorm rains of summer afternoons are of this type, which is characterised by great intensity and comparatively short duration. Although the most severe storms are experienced in the tropics, rainfall rates in the British Isles occasionally reach 5 ins. per hour and in London have exceeded 10 ins. per hour over a minute or so.

Mountain ranges tend to deflect winds upwards, and if they are sufficiently moisture-laden the forced ascent produces persistent and widespread *orographic* rain. The cloudiness and heavy rainfall (exceeding 150 ins. per annum in some places) of the W. coast of Scotland are due to the westerly air streams having to rise over the steep W. slopes of the Highlands. The Pennines receive at least 10 ins. more rain a year than the valley of the Yorkshire Ouse. One of the most striking examples of orographic rainfall is provided in E. Assam—the wettest area on earth—where rapid ascent of the S.W. monsoon results from a converging system of ranges; at Cherrapunji (4,310 ft.), on the S. slopes of the Khasi Hills, more than 300 ins., on the average, is deposited between June and Sept., but at Shillong, 25 m. distant on the N. leeward slopes, the total for the same period is only 55 ins. Cherrapunji has recorded 900 ins. of rain in a year. The effect of the orientation of mountain ranges and hills upon the prevailing winds

accounts for the W. Ghats being rainier than the Deccan (the wet monsoon comes from the Arabian Sea) and British Columbia wetter than Alberta (the Rocky Mountains obstruct the westerlies).

Steady downpours associated with the passage of a depression are due to the vertical motion set up by an air mass rising over another air mass of different temperature. This rain is referred to as *cyclonic*. Although all these factors may contribute towards the rainfall of an area, in countries like the British Isles and Japan which lie in the tracks of depressions, a considerable proportion of the total amount, e.g. in autumn and winter in the English Midlands, is cyclonic in origin.

Rainfall is the complement of evaporation, a process continually in operation, especially at the surfaces of the oceans and the great seas. The complete cycle depends upon the carrying power of the winds to move the wet air from above the oceans landwards, and upon gravitation which forces the rainwater oceanwards. Winds from the sea are carriers of water vapour, and, in general, coastlands are rainier than inland areas. Exceptions occur for two reasons; first, the winds may blow always from the coast seawards, and secondly, the coastland may be so much warmer than the sea that the oceanic wind is not chilled but warmed at the coast. Then the

coasts are almost rainless; S.W. Africa has a coastland of the first type, and Sind of the second.

The chief rainfall regions of the globe are (a) equatorial, where the rainfall is mainly due to convection and occurs at all seasons but is heaviest at the equinoxes; (b) tropical (in the regions bounded by the equatorial belts and trade-wind deserts, e.g. Sudan and Rhodesia), where summer is wet and winter dry, the dry period being longer the farther from the Equator; (c) monsoonal (inside and outside the tropics, chiefly on the E. coasts of continents), where the contrast between wet and dry seasons is more pronounced owing to the seasonal changes in the prevailing winds; (d) westerlies (rainy zones polewards of the trade-wind belts), where there is precipitation throughout the year, mainly cyclonic in origin—in the interior of continents (e.g. Siberia and Manitoba) the summer rains, associated with thunderstorms, are the heaviest, but on the western seaboard (e.g. British Isles) and the islands in the open ocean (e.g. S. Island, New Zealand) the maximum occurs in autumn or winter and the minimum in spring; (e) Mediterranean (on the W. coasts of continents in sub-tropical latitudes, e.g. California and Cape Province, S. Africa), where summer is dry and winter the rainy season.

Most of the hot deserts (e.g. Sahara and Kalahari) are rainless because of the dry trade-winds which blow over them, while over cold deserts (e.g. Gobi) the temperature of the air is too low for the transportation of appreciable amounts of water vapour. In Antarctica and the interior of Greenland rain seldom falls, the precipitation being in the form of snow; Arctic Canada and Eurasia receive the bulk of their rainfall in summer and autumn.

The study of rainfall is of the greatest importance in connexion with the cultivation of a specific crop, e.g. regions suitable for growing cotton, tobacco, rice, and the different varieties of wheat are largely determined by the character of the rainfall. Failure of the monsoon rains in India and China may result in famine; in Queensland severe droughts caused the loss of 10 million sheep in three years. On the other hand, the notorious floods of the Yang-tse bing ruin and disaster to widespread areas. Planning irrigation schemes where the rainfall is either inadequate or unreliable, and providing reservoirs for the supply of

water to large centres of population are major economic projects.

Rainfall is intimately related to the main types of natural vegetation. Grass and scrublands (summer rains) are drier than forests. Winter rain regions have characteristic leathery-leaved trees and usually no grass. *See* Climate; Meteorology; Precipitation; Rain; Weather.

A. J. Drummond, F.R.Met.S.

Rain Gauge. Instrument used for measuring the fall of water, whether in the form of rain, hail, or snow. A funnel, usually 5 ins. or 8 ins. in diameter, catches the rain and leads it into a sunken collecting vessel consisting of a glass bottle resting inside a copper can. In the standard British pattern the funnel is deep with vertical sides to minimise errors due to splashing and to retain snow. The gauge is exposed with its rim 1 ft. above the ground in an open situation, the site being carefully chosen to ensure reliable results. At fixed times the precipitation is poured from the collecting vessel into a measuring glass, which is graduated to read very small amounts. The graduations record inches or mm. of rain, and depend upon the capacity of the measuring glass in relation to the superficial area of the funnel in which the rain is caught.

Many rain gauges are self-registering. In this type the collected rainfall generally is made to raise a float carrying a pen which traces a record on a chart wrapped round a clockwork-driven cylinder. When the limit of the chart is reached an automatic device returns the pen to the zero line, allowing the recording to continue. In countries where large snowfalls occur specially designed gauges are needed.

Rainham. A town of Essex, England. Built on a creek of the Thames, N.W. of Purfleet, about 12 m. E. of London, it has a rly. station on the Tilbury line. There is a notable church dating from the Norman period. Pop. 3,897. There is also a village of the same name in Kent, about 4 m. S.E. of Chatham, on the Dover road A2.

Rainier or **TACOMA.** Quiescent volcano in Washington, U.S.A. It is situated in the Cascade Range, alt. 14,408 ft. Fourteen glaciers lie around its summit, and dense woods clothe its lower sides. Its crater emits fumes, but no recent eruption has occurred, and the eroded slopes indicate that there has been none for a very considerable period.

Rain-making. Production of rain by mechanical or other means. Among primitive peoples many usages and rites are practised for the purpose. They may be mimetic, as with the Australian Arunta group, in which the members of the water-totem imitate a rising storm. In New Guinea, Africa, and America this is achieved by bull-roarers, which the Navaho make from lightning-riven pines, and the Zuni accompany by frothy decoctions simulating cloud.

In some African tribes the rain-maker is the local chief, using magical stones and spears of traditional sanctity. Animal sacrifice is observed by the Alikuyu with sheep and goats, and by the Buriat with horses. Some N. Indian forest-tribes immerse or sprinkle old people; in N. Africa a dressed-up ladle, ghanja, is carried in procession and sprinkled; the ceremonial immersion of saint-images survived into 19th century France.

Attempts to induce rain have included firing guns, and sowing "germs" from aircraft into certain types of clouds under favourable weather conditions. The latter method depends on the discovery that large numbers of tiny water-ice crystals form in air which is quickly cooled to very low temperatures. If small pellets of solid carbon dioxide at -80°C . are allowed to fall through an already cold cloud, the air in the cloud is further cooled with the production of billions of these crystals, which grow in size at the expense of the vapour molecules and the water droplets present in the cloud; eventually large snowflakes form and begin to fall, and once below the freezing level they thaw into raindrops. Rain has been artificially generated over limited areas in N. America and Australia in this way, but it sometimes evaporates before reaching the ground.

Rainy or **RÉNÉ.** Lake on the borders of Canada and U.S.A. It lies 155 m. W. of Lake Superior, and is about 50 m. long and from 3 m. to 8 m. broad. The outflow is past Fort Frances by the Rainy river into the Lake of the Woods. The frontier between Ontario and Minnesota follows the river and the lake's S. shore.

Rainy, ROBERT (1826-1906). Scottish divine. Born in Glasgow, Jan. 1, 1826, the son of a professor of medicine at the university, he was educated there. After training at New College, Edinburgh, he became a minister of the Free Church at Huntly in 1851, and in 1854 removed to one in Edin-



R. Rainy,
Scottish divine

burgh. In 1862 he was chosen professor of church history at New College, and in 1874 he became its principal. He resigned in 1900, and died at Melbourne, Dec. 22, 1906. Rainy was long the most prominent figure in his Church, and had a good deal to do with the union of the U.P. and Free Churches which became the United Free Church, of which body he was the first moderator.

Raipur. District and town of the Madhya Union, India, in the Chhattisgarh division. The district forms part of the Chhattisgarh plain in the upper Mahanadi valley. Only the W. of it is served by rlys., which radiate from the chief town. The rainfall is 49 ins., and rice and pulses are the chief crops. Area, 8,205 sq. m. The town has a valuable trade in cotton, grain, and lac, largely due to the Bombay - Nagpur - Calcutta rly. The walled fort was built in 1460. Pop. of the dist., 1,516,686; of the town, 63,465.

Raisin (Fr. from Lat. *racemus*, a cluster of grapes). Dried grape. It is used as a dessert fruit and in puddings, especially as a constituent of the Christmas plum pudding, the hard pips being extracted before use. Raisins are imported from France, Spain, and European and Asiatic Turkey (see Sultana). The ordinary raisin is made by drying in an oven, but the better sort, such as Muscatel raisins, are sun-dried, being left until thorough dried on the vine, the stem of the branch being half-cut through and the leaves removed. Seedless raisins are now common. See Australia; Grape.

Rait, ROBERT SANGSTER (1874-1936). Scottish historian. Born at Aberdeen, Feb. 10, 1874, he was educated at its university and New College, Oxford, being fellow of the latter from 1899. In 1913 he was made professor of Scottish history and literature at Glasgow and in 1929 principal and vice-chancellor of the university, having been Historiographer Royal for Scotland from 1919. Knighted 1933, he died May 25, 1936. Among his works are *The Scottish Parliament, 1901*; *Scotland, 1911*; *History of Scotland, 1914*; *The Parliaments of Scotland, 1924*; and he edited in 1901 the unpublished writings of James I.

Raj. Hindu word meaning rule. The British raj in India meant the British sovereignty. See India.

Raja. Indian title of honour meaning king. It has been given to rulers and others and sometimes hereditarily by the British government to Hindus. The feminine is ranee or rani.

Rajagopalachari, CHAKRAVARTY (b. 1879). Indian statesman. A Brahmin, he was born in Hosur, Madras, and educated at the central college of Bangalore, Presidency college, and the law college of Madras. Called to the bar in 1900, he became a successful barrister. He joined the non-cooperation movement in 1920, editing Gandhi's paper *Young India* during the latter's imprisonment. General secretary of the Indian national congress during 1921-22, he led its representatives in the Madras legislature, and was prime minister of Madras during 1937-39. The following year he was imprisoned under the Defence of India Act. Governor of the W. half of Bengal after the partition of 1947, he succeeded Lord Mountbatten as gov.-gen. of India in 1948-50, the only Indian to hold that office.



C. Rajagopalachari,
Indian statesman

Rajahmundry. Town of India, in Madras state. It is at the head of the delta of the Godavari, 30 m. from the sea and 365 m. N.N.E. of Madras on the rly. between Madras and Calcutta. The town was granted to the French in 1753 and evacuated by them in 1758, when it became British. It is an important river-crossing for road and rly. Pilgrims from the neighbourhood go to Benares, and carry away a pot of Ganges water; on their return to the bathing ghat here they empty half into the Godavari, then fill up the pot from it. Pop. approx. 74,500.

Rajasthan, UNION OF. Largest state of the Indian Union, composed of former Rajputana states. When formed in 1948, it comprised Banswara, Bundi, Dungarpur, Jhalawar, Kishangarh, Kotah, Parthagarh, Shahpura, Tonk, and Udaipur. As "Greater Rajasthan" it was joined in March, 1949, by Bikaner, Jaipur, Jodhpur, and Jaisalmer, and two months later by the Matsya union states of Alwar, Karauli, Dholpur, and Bharatpur. The capital of the

union is Jaipur. Rajasthan has an area of 140,000 sq. m. and a pop. (1950 est.) of 14,690,000.

Rajbansi (Hindustani, royal-born). Caste-name used by the hinduised Bengali-speaking section of the Koch people in N.E. India. Of some 2,000,000 persons, nine-tenths are in Bengal, the remainder in Assam, Bihar, and Orissa. Descendant from a Dravidian tribe in the Ganges basin at the Aryan immigration, they now claim Kshatriya ancestry, and imitate the Brahmanical rite in the marriage ceremony. See Koch.

Rajendralala Mitra (1824-91). Indian Orientalist. He was born in the neighbourhood of Calcutta, Feb. 15, 1824. In 1846 he was appointed librarian of the Asiatic Society of Bengal, of which he was vice-president, 1861-84, and then president till his death, July 26, 1891. He was made C.I.E. in 1878, and given the title of raja in 1888. One of the most profound Oriental scholars of modern times, his many works on historical, antiquarian, architectural, and religious subjects are of permanent importance. They include *The Antiquities of Orissa*, 2 vols., 1875 and 1880; *Bodhi Gaya*, 1878; and *Indo-Aryans*, 1881.

Rajk, LAZLO (b. 1909). Hungarian politician, tried for treason in 1949. See Hungary in N.V.

Rajkot. Town and former state of India, now in the Saurashtra union. Native food grains, sugarcane, and cotton are grown. The town is a rly. junction, and has a college for the education of sons of Kathiawar chiefs. Here was the residence of the political agent for E. Kathiawar. Area, 282 sq. m. Pop., state, 102,951; town, approx. 16,000.

Rajmahal. A town of Bihar, India, in the Santal Parganas. It is the terminus of a branch rly., situated on the Ganges, 65 m. N.W. of Murshidabad, and was formerly of considerable importance. The Rajmahal Hills form the extreme N.E. edge of the Deccan plateau; the Ganges bends S. round them. Pop. 8,200.

Rajpipla. Part of Bombay state, India, formerly the premier state in the Gujarat agency. Lying S. of the Narbada, with Baroda to N.W., it covers 1,517 sq. m. of fertile land with cotton crops and forests of teak. There is a rly. from Rajpipla, the capital, to Ankleswar. The maharaja, Sir Shri Vijaysinhji, who acceded in 1915, won the 1934 Derby with Windsor Lad. Pop. 249,032.

Rajpramukh (Skt., ruling chief). Constitutional head, equivalent of governor, of a state or union of states within the Indian Union. The title is usually given to one of the princes whose states have been merged into a larger unit. In each union of states there is also an up-rajpramukh (deputy), and Rajasthan has a maharajpramukh (principal).

Rajput (Skt., king's son). Mainly Hindu race in the N. of the Indian sub-continent between Sind and the Uttar union, belonging chiefly to the warrior caste. The area in which most of their states are situated is known as Rajputana (v.i.). In the times of the Moguls the Rajputs gave their daughters in marriage to the conquerors; but this was never done by the rulers of Udaipur, whose fortress of Chitor was three times sacked, the last time by Akbar in 1567. In memory of that disaster the ruler of Udaipur made a vow never to set foot in Delhi. The emperors Jehangir, Shahjehan, and Aurungzebe were the sons of Rajput princesses; the last in spite of his orthodoxy also took a Rajput bride. Only a small section embraced Islam, but the premier Sikh maharaja of Patiala traced his descent from the Rajput dynasty of Jaisalmer. A Rajput famous in England was K. S. Ranjitsinhji.

Rajputana. Geographical name of an area of N.W. India bounded by Bombay, the Punjab, the Uttar union, and Madhya Bharat. The Aravalli Mts. cross the region from N.E. to S.W.; the larger portion N.W. of the mts. is sandy and infertile, and forms on the W. the desert of Thar; the smaller area S.E. of the mts. is more elevated, rainier, and more fertile, and is drained by the Chambal and its tributaries. In the N.W. the people are nomadic, with herds of cattle, sheep, and camels; in the S.E. millet, oilseeds, wheat, and barley are grown. The Rajputs are Hindus who speak Rajasthani. Jaipur is the largest city. After the partition of British India most of the 23 Rajput states joined the union of Rajasthan (q.v.). Ajmer (q.v.) came under central govt.

Rajshahi. Former division and district of Bengal. In 1947 it was divided between India and Pakistan. The original div. stretched from the Padma distributary of the Ganges, W. of the Brahmaputra, to the frontier of Bhutan. The staple crop is paddy, but jute and oilseeds are also cultivated,

and the hemp of Rajshahi supplies all Bengal's requirements of the drug ganja. On June 12, 1897, the dist. was shaken by an earthquake which destroyed many public buildings. The East India Company took over the Zemindary of Rajshahi in 1765; it was reduced in size in 1793, and later by the formation of the Malda district in 1813, that of Bogra in 1821, and that of Pabna in 1832. Under partition the dist. of Rajshahi went to Pakistan, with Rangpur, Bogra, Pabna, and parts of Dinapur, Jalpaiguri, and Malda. Other parts of those three dists. went to India, which also took the Darjeeling dist. of the former Rajshahi div. The effect of partition was to give the Rajshahi div. of Pakistan an area of 13,488 sq. m. and pop. of 9,482,611. The territory assigned to India covers 6,154 sq. m. and has pop. 2,557,854. Of the dist. of Rajshahi, the area is 2,523 sq. m. and pop. 1,571,750.

Rakahanga. One of the Cook Islands, a dependency of New Zealand. It lies 25 m. N. of Manihiki and 670 m. N. of Rarotonga. It is an atoll, but the lagoon has no pearl shells. Copra is produced. Pop. 318.

Rake. Implement used for heaping loose material together, for smoothing the ground in connexion with sowing, for pulling out weeds, and other special purposes. Essentially a rake is a toothed bar attached at right angles to a handle. The teeth, or tines, are of wood in a light hay-rake, long but also wooden in a caving rake, and of steel wire in a general purpose rake, while couch-rakes for weeding have curved iron teeth, and heel-rakes long curved steel teeth. For work on a large scale a horse-rake is used. A cultivator is a rake with long, curved, barbed tines.

Rake. A nautical term to describe the backward, stern to stern, slope of a ship's masts or funnels; also the backward slope of the stern by as much as it overhangs the keel. When a mast inclines towards the bow, like the foremast of the Spanish galleon, it is said to have a fore-rake. A rakish ship indicates a vessel having fast lines but an undisciplined appearance. Raking fire is when guns enfilade a ship, or sweep it in the direction of its length. In architecture the rake of a roof is its slope or pitch; in the theatre the rake of a stage is its inclination from level; and in mining a rake is a vertical or highly inclined rent or fissure in the strata.

Rake's Progress, THE. Series of eight pictures by Hogarth (in the Soane Museum, London). It was painted after the artist had established his reputation in 1734 with the series of *The Harlot's Progress*. The rake is a young man of fashion who plunges into debauchery, seeks to recuperate his waning fortune by gambling, is imprisoned for debt, and finally ends his days in a lunatic asylum. A ballet in six scenes based on the Hogarth series, with music by Gavin Gordon, choreography by Ninette de Valois, and décor by Rex Whistler, was produced at Sadler's Wells in 1935. The word rake in this connexion comes from the 16th century phrase rake-hell.

Rakoczy OR RAGOTSKY, GEORGE (1591-1648). Prince of Transylvania. The son of Sigismund Rakoczy, a Hungarian magnate, he was elected prince of Transylvania in 1631. In 1643 he allied himself with the Swedes and the French, and roused Hungary against Austria with the intention of making himself king of Hungary. When his army was close on Pressburg (now Bratislava) he was compelled, by the intervention of the Turks, to conclude an armistice, on which peace soon followed. As a reward for abandoning his pretensions, Rakoczy received the hereditary dignity of a prince of the empire and seven Hungarian counties. He died Oct. 24, 1648.

Rakoczy's son, George (1621-60), became prince of Transylvania. He fought against the Poles and was deposed, being killed whilst resisting the Turks. His only son, Francis (1645-76), was prince for a short time, and the latter's son, Francis (1676-1735), became, owing to his wealth and descent, the leader of the Magyars in their rising against the rule of the Hapsburgs.

Raleigh. City of North Carolina, U.S.A., the state cap. and the co. seat of Wake co. It is 205 m. N.E. of Columbia, and is served by the Southern and other rlys. An important educational centre, it is the site of Shaw university, and contains the state college of agriculture and mechanical arts, and colleges for women and coloured students. Among the products are cotton goods, hosiery, agricultural implements, boilers, and stationery. Raleigh is an early example of town planning, the ground plan of the city having been adopted by the state convention in 1792. The city was named in honour of Sir Walter Raleigh. Pop. 46,897.

Raleigh, CECIL. Pseudonym of Cecil Rowlands (1856–1914), British playwright. He wrote Drury Lane melodramas, either in collaboration with R. C. Carton, Augustus Harris, Henry Hamilton, and G. R. Sims, or alone. Three of his best were *The Sins of Society*, 1907; *The Whip*, 1909; *Sealed Orders*, 1913. He died Nov. 10, 1914.

Raleigh OR **RALEIGH, SIR WALTER** (c. 1552–1618). English soldier, sailor, courtier, and writer. He was born at Hayes Barton, near Budleigh Salterton, Devon, and educated at Oriel College, Oxford. After service with the Huguenots in France and the Netherlands, 1569–78, he went on a voyage of discovery with his half-brother, Sir Humphrey Gilbert, reaching the West Indies. He next took part in the suppression of Desmond's rebellion in Ireland, where later he was granted large tracts of confiscated land in Munster, acquired the famous house known as Myrtle Grove at Youghal, and built another house at Lismore. He appeared at the English court in 1581, and became a prime favourite with Elizabeth, who knighted him in 1584. For the story that he first gained the queen's favour by placing his cloak over a muddy pool in her path there is no earlier authority than Fuller's *Worthies of England*, 1662.

In 1578 and 1583 Raleigh was associated with the unsuccessful attempts of Gilbert to plant a colony in N. America. Gilbert was lost at sea, 1583, but next year Raleigh, though not permitted to go himself, fitted out an expedition which planted itself in what is now known as North Carolina, probably on the island of Roanoke. Raleigh called the colony Virginia, a name given for many years to the whole seaboard from Florida to Newfoundland. Other expeditions followed in successive years, one under Raleigh's cousin Sir Richard Grenville, and from Virginia tobacco and potatoes were first introduced into England and Ireland. The patent granted to Raleigh in 1584 lapsed to the crown in 1603, and the realization of his dream of a Greater England overseas was postponed until he was a prisoner in the Tower and the idea was taken up by others as a commercial enterprise.

Appointed vice-admiral of Devon and Cornwall, 1585, Raleigh helped to draw up a plan of defence against invasion in 1588, but it is doubtful if he took any personal part in the fight with the Spanish Armada.

Meanwhile Essex, with whom he quarrelled, superseded him in the queen's favour, and he was committed to the Tower in 1592 for an intrigue with Elizabeth Throgmorton, one of the queen's maids of honour, his subsequent marriage to whom caused him to be ostracised from court. M.P. for Michael, Cornwall, 1593, he made his famous voyage to the Orinoco in quest of El Eldorado in 1595, and in 1596, being restored to favour, he took a leading part, with Essex, in the Cadiz expedition, and distinguished himself at the Azores in 1597. M.P. for Dorset, 1597, and for Cornwall, 1601, in 1600–03 he was governor of Jersey.



On the accession of James I, 1603, Raleigh was charged with plotting against the new king and favouring the cause of Arabella Stuart. After a scandalously unfair trial he was found guilty and condemned to death. Reprieved on the scaffold, he was sent to the Bloody Tower, where, with his wife and son, he lived until Jan. 30, 1616. Then he was released to lead another expedition to the Orinoco, promising the king not to interfere with Spanish settlements. The expedition left England in 1617, and as was inevitable it came into collision with the Spaniards, its leader's son being slain. Raleigh returned, and his punishment being demanded by the Spanish minister, he was arrested. Bacon, the lord chancellor, acquiescing, he was arraigned on the old charge of treason, and executed in Old Palace Yard, Westminster, Oct. 29, 1618, his remains being interred in St. Margaret's.

Raleigh was the incarnation of the spirit of the Elizabethan era. As courtier, soldier, sailor, politi-

cian, poet, historian, chemist, he took rank among the foremost of his fellows. He was the pioneer of British colonial empire. A friend of Spenser, who called him Shepherd of the Ocean, he secured royal favour for the publication of *The Faerie Queene*. Raleigh was also a crony of Marlowe, and the foundation of the Mermaid Club (*q.v.*), in Friday Street, is attributed to him. His career was always exciting, but often sordid; he was as much pirate as explorer, and as ready to patronise the quack as the genius. His career affected history only slightly.

Raleigh's books include *The Last Fight of the Revenge*, 1591; *The Discovery of Guiana*, 1596; *Relation of Cadiz Action*, first printed 1805; *History of the World* (to the second Macedonian War), 1614, in which he was assisted by Jonson and other scholars, a work written in the Tower, and ending with the celebrated apostrophe to death; *The Prerogative of Parliaments*; *The Cabinet Council*; *Discourse of War*; *Apology for the Voyage to Guiana*. His most notable verses are *The Pilgrimage*; *The Lie*; *Reply to Marlowe's Come Live With Me and Be My Love*; *Even Such Is Time*.

Bibliography. Works, 8 vols., with Lives by Oldys and Birch, 1829; Poems, ed. J. Hannah, 1892; Lives, E. Gosse, 1886; W. Stebbing, new ed. 1899; J. R. Rodd, 1904; H. de Selincourt, 1903; M. A. S. Hume, new ed. 1926; E. Thompson, 1935; R. Waldman, new ed. 1943; Sir W. R. in Ireland, Sir J. P. Hennessy, 1883; *State Trials*, ed. H. L. Stephen, 1899; R.'s *Last Voyage*. V. T. Harlow, 1932; R. and His World, I. Anthony, 1934.

Raleigh, SIR WALTER (1861–1922). English scholar. A Londoner and the son of a Congregational minister, he was born Sept. 6, 1861. He went to University College, London, and King's, Cambridge, and was professor of modern literature at Liverpool; of English literature at Glasgow from 1890; and of the same subject at Oxford from 1904 until his death on May 13, 1922. In 1911 he was knighted. He wrote *The English Novel*, 1894; *Style*, 1897; *Romance*, 1917; and appraisals of Stevenson, Milton, Wordsworth, and Shakespeare; was responsible for the first volume of *History of the War in the Air*; and in light vein threw off the lines written at a garden party, beginning "I wish I loved the human race."

Raleigh Bay. Broad bay off the S.E. coast of North Carolina, U.S.A. Formed by long, narrow

sand dunes, it stretches from Cape Hatteras in the N.E. to Cape Lookout in the S.W., and communicates with Pamlico Sound through Ocracoke Inlet.

Rallentando. Musical term. Of Italian origin, it signifies gradually decreasing the speed of music, most frequently at the end of a piece or of an important section thereof, but also employed towards the close of a phrase and in other places. A similar term is *Ritardando*.

Ralph Roister Doister. Early English comedy. Written by Nicholas Udall (*q.v.*), and first produced about 1551 at Westminster school, where it was revived in 1921, Ralph Roister Doister is based on the *Miles Gloriosus* of Plautus. The plot concerns the unsuccessful wooing by the vain-glorious Ralph of the wealthy widow Dame Christian Custance. Matthew Merygreeke, the fun-loving and good-natured friend of Ralph, is Udall's own creation.

Ram. This device used in hydraulic power installations is described under Pump.

Ram. Projecting forefoot or lower portion of a ship's stem below the water-line. It was formerly fitted to the bow of a warship in order to sink an enemy vessel when driven into it. The ram was introduced by the Phoenicians as a large metal trident, with two prongs above water and one below, fitted to an oared galley. It was adopted for English warships in the third crusade and developed into an effective weapon, being the only means of destroying an enemy ship, except by boarding or fire, until the introduction of cannon. With the development of the sailing warship the ram was abolished, but was revived for steam warships after the successes of the Confederate vessel *Merrimac* in ramming Federal ships in the American Civil War. On July 20, 1866, the Austrian battleship *Ferdinand Max* rammed and sank the Italian battleship *Re d'Italia* at Lissa. Until the end of the 19th cent. the underwater stem of every battleship was built in the form of a ram, but experience proved this device almost as dangerous to the rammer as to the rammed. There have been disasters through accidental ramming by warships: the *Vanguard* was sunk by the *Iron Duke*, Sept. 1, 1875; the *Grösser Kurfürst* by the *König Wilhelm*, May 31, 1878; the *Victoria* by the *Camperdown*, June 22, 1893. In both Great Wars warships and merchantmen used

their bows for ramming in favourable circumstances, particularly against the thin hulls of submarines. On April 8, 1940, the British destroyer *Glow-worm* attempted to sink by ramming the German cruiser *Hipper*.

Rama IX. Name taken at his coronation, 1950, by Phumibol Aduldet (*q.v.*), king of Siam.

Ramadan. Ninth month of the Mahomedan year (in May-June). Sanctified as the month in which the Koran was revealed to the Prophet, it is kept as a strict fast, no food, smoking, or any form of self-gratification being permitted on any day between dawn and sunset. In addition there are many extra devotional practices, especially during the last ten days.

Ramadie. Town of Iraq. On the Euphrates, it is 59½ m. W. by N. of Bagdad. The battle of Ramadie was fought between the British and the Turks, Sept. 28-29, 1917. On Sept. 26 General Maude concentrated a force for its capture. The place was strongly held, but, by means of a flanking movement, the Turks were forced to surrender on Sept. 29.

Ramadier, PAUL (b. 1888). French statesman. Born at La Rochelle, he was educated at Toulouse and Paris universities. After serving in the First Great War, in 1919 he entered politics as mayor of the Socialist centre of Decazeville.



Paul Ramadier, French statesman

A brilliant lawyer, he was under-secretary for public works in Léon Blum's government during 1936-37, and minister of labour under the Daladier and Chautemps coalitions, 1937-38. After the Franco-German armistice, 1940, he retired from public life, and played an active role in the resistance movement. In Nov., 1944, he joined de Gaulle's govt. as minister of food, was minister of justice in Blum's "caretaker" govt., and in Jan., 1947, became premier, resigning in Nov. when the measures he proposed to overcome financial and industrial difficulties failed to avert serious civil disturbances.

Ramah. Name meaning a height, and used in the Bible for a number of places which are difficult to identify. One was the site of Rachel's tomb. The modern Er Ram (Ramah), E. of the Nablus

road, and 6 m. N. of Jerusalem, was associated with the life of the prophet Samuel, and figured in the wars between the ten tribes and the tribe of Judah.

Raman, SIR CHANDRASEKHARA VENKATA (b. 1888). Indian physicist. He was born Nov. 7, 1888, and educated at Presidency College, Madras. After holding various research posts in India, the U.K., and the U.S.A., he was professor of physics at Calcutta university from 1917 to 1933. Raman was elected president of the Indian academy of sciences in 1934. He studied specially the properties of light, discovering in 1928 the Raman effect, for which he was awarded the Nobel prize for physics in 1930. Later he became head of the Raman research institute at Bangalore, set up to study the problems which had long been his speciality. Raman wrote many books, most of them on light, some on the physical aspects of music, e.g. *Mechanical Theory of Bowed Strings and Violin Tone*; *Theory of Musical Instruments*.

The Raman effect is concerned with the scattering of light by a liquid carefully freed from any suspended particles. The scattered spectrum contains lines additional to those in the incident light. Thus, if γ_0 is the frequency of a primary spectral line, it gives rise to frequencies $(\gamma_0 + \gamma_R)$ and $(\gamma_0 - \gamma_R)$ when γ_R is the characteristic Raman frequency of the liquid. It is, in fact, the fundamental vibrational frequency of the liquid molecules.

Ramayana. One of the two great epics of ancient India, *Mahabharata* being the other. Described as the Indian *Odyssey*, it tells of the wanderings and adventures of Rama, a prince banished from his country. The period, about 1000 B.C., is regarded as the Golden Age of India, the period of the Kosalas, to whom Rama belonged, and the Videhas, from whom came his devoted wife Sita. Rama and Sita are the Hindu ideals of perfect man and perfect woman. The poem, dating from some unknown time, and attributed to one Valmiki, has been added to again and again until it consists of 48,000 lines. An Italian edition and translation, 1843-67, first made it known to European readers. A large part of it was published in English verse by Ralph Griffith, 1868-74, and a prose translation has been issued at Calcutta. A condensed translation in verse is by Romesh Dutt, 1899. Consult *The Indian Epics*, J. C. Oman, new ed., 1899.

Rambert, MARIE. Polish-born British dancer and teacher. Born at Warsaw, she studied there, and appeared with the Diaghilev company during 1912-14. She founded her own company in 1926, and helped to initiate the Camargo Society which presented ballet in the early 1930s. She founded a ballet school at the Mercury Theatre, London, where she directed the Ballet Rambert. From 1942 she worked in conjunction with the Arts Council. The many famous dancers whom she trained included Pearl Argyle, Frederick Ashton, Harold Turner, Sally Gilmour, and Walter Gore. She married Ashley Dukes (*q.v.*). See Ballet.

Rambler. Name given to a group of climbing roses. The crimson Rambler, a hybrid between *Rosa wichuraiana* and *R. multiflora*, was the first of the kind cultivated. Single and double varieties of many colours are now grown. They have dense clusters of small flowers and are good pergola plants. See Rose.

Rambler, THE. Periodical issued by Dr. Johnson during 1750-52. A series of moral and religious essays, although at times stilted in style and sentiment, they acquired great popularity, and were mainly responsible for Johnson's reputation among his contemporaries. Published by Cave, the Ramblers appeared every Tuesday and Saturday between March 20, 1750, and March 14, 1752. They were all written by Johnson except Nos. 10, Mrs. Chapone; 30, Miss Catherine Talbot; 97, Samuel Richardson; 44 and 100, Elizabeth Carter. See Johnson, Samuel.

Rambouillet, CHATEAU DE. Palace at Rambouillet, dept. of Seine-et-Oise, France. Now used as the summer residence of the president of the French Republic, it lies 30 m. by rly. S.W. of Paris. The château has magnificent parks and gardens laid out by Lenôtre, and an interesting dairy built by Louis XVI. In the château Francis I died in 1547, and Charles X signed his abdication in 1830. It passed into the possession of the nation at the Revolution.

Rambouillet, CATHERINE DE VIVONNE, MARQUISE DE (1588-1665). French lady. Born at Rome of an aristocratic Roman family, she married the marquis de Rambouillet in 1600, and, as mistress of

the famous Hôtel Rambouillet, in the rue St. Thomas-du-Louvre, Paris, became from about 1608 onwards the centre of a social and intellectual circle unrivalled in its day. She died Dec. 2, 1665. Her daughter Julie (1607-71) married the duc de Montausier, 1645, and was also a woman of high intellectual attainments.

Rambutan (*Nephelium lappaceum*). Tree of the family Sapindaceae. It is a native of Malaya, and bears a bright red, oval fruit, closely related to the litchi nut. See Litchi.

Rameau, JEAN PHILIPPE (1683-1764). French composer. Born at Dijon, Oct. 25, 1683, he became a church organist in Lille and Clermont-Ferrand before settling in Paris in 1722. He immediately attracted attention by his treatise on harmony, and the next year one of his lighter pieces was mounted at the Opéra Comique. His opera Hippolyte et Aricie was played at the Opéra, 1733, the first of a score, notable among which was *Castor et Pollux*, 1737. He published other important works on musical theory, *e.g.* his *Démonstration du Principe de l'Harmonie*, 1750. His harmonic theories, especially his ideas on chord-building by thirds and on the fundamental bass, profoundly influenced musical development in the 18th century. He died in Paris, Sept. 12, 1764. See Lives, A. Pougin, 1876; L. Laloy, 1908.

Ramée, MARIE LOUISE DE LA. British novelist who used the pseudonym of Ouida (*q.v.*).
Rameses or **RAMESSU.** Name of two Egyptian kings of the XIXth and of nine of the XXth dynasty. Rameses II, styled the Great, and long reputed to be the Pharaoh of the Oppression, reigned for 67 years from about 1300 B.C. He waged tedious wars against the Hittites, which resulted in his 21st year in a treaty preserved in a hieroglyphic version at Karnak, and in cuneiform on a tablet that was found at Boghazköi in 1907.

The greatest of Egyptian builders, one half of the temples still extant date from

his reign, and his name or portrait occurs in nearly every great group of ruins. His finest statue is at Turin. Near the Theban Ramesseum are the remains of a statue estimated to have weighed 1,000 tons; the colossal head of another was removed to the British Museum. His mummy is at Cairo. See Abu-Simbel; Karnak; Luxor; Memphis; Pentaaur; Sesostris.

Rameses III. King of Egypt. The Rhampsinitus of Herodotus, and the virtual founder of the



Rameses III, King of Egypt
Head of the mummy in
Cairo Museum

XXth dynasty, he reigned for 32 years from about 1200 B.C. He undertook several defensive campaigns, used naval craft in the Mediterranean, and came into conflict with the Philistines. His majestic Theban temple at Medinet Habu, together with the great Harris papyrus in the British Museum—133 ft. in length, the longest known—record his military achievements and opulent temple-gifts. His tomb, 400 ft. long, discovered by James Bruce, contained a sarcophagus now in Paris, the lid being at Cambridge. His mummy is at Cairo.

Rameswaram. Town and island of Madras state, India, in Ramnad dist. The island is 18 m. long and stretches S.E. towards Ceylon at the head of the Gulf of Manaar; from it Adam's Bridge (*q.v.*) reaches towards Ceylon. The rly. from Madura runs across the island through the town to the S.E. tip. Bêche-de-mer is obtained in neighbouring waters. In the town is a gate-tower temple with corridors 4,000 ft. long, visited annually by crowds of pilgrims. Pop. 15,500.

Ramie. Bast fibre of a stingless nettle, *Boehmeria tenacissima* or *B. nivea*, also known as rhea and China grass. The latter name is given to fibre hand-cleaned from the bark in China, and fine native cloth hand-made from long unspun



Rameses II
Head of the mummy in
Cairo Museum

fibres thus derived is sold as grass cloth. The fibre comes to Europe from China, Malaya, and the



Ramie fibres, magnified about 10 times

Indian sub-continent in the form of dried ribbons with the bark adherent, stripped from the stem and containing a strong insoluble gum or resin. This last having been decomposed, ramie can be card-

ed or combed and spun upon worsted or flax machinery. The yarn has great tensile strength, but is so brittle as to snap easily at a knot. The fibre is heavy but inflammable, does not contract when wetted, and is short of elasticity. Almost all incandescent gas mantles are made from ramie, as the ash of the fabric does not shrink like cotton upon burning. An artificial straw for hats is made by agglutinating parallel fibres into a ribbon. The fibre is extensively used in making cordage, nets, and paper for banknotes.

Ramillies, BATTLE OF. British and Dutch victory over the French, Whitsunday, May 23, 1706. Ramillies is in the Belgian prov. of Brabant, 12 m. N. of Namur. The War of the Spanish Succession was raging, and, prevented by the Dutch from marching into Italy, Marlborough turned against the French, who had one army under Villeroi on the borders of the Netherlands, and behind it another under Marsin. These proposed to unite, but before they had done so Marlborough, having divined the plan, reached Ramillies and offered battle. Villeroi did not wait for Marsin's main army.

The French army was arranged with the artillery in the centre, protected by infantry with cavalry on the wings. Marshy ground was on their left, where flowed the Little Gheet river, while their right was protected by two small villages which they held. They were faced by the English and Dutch, infantry in the centre and cavalry on the flanks. The encounter opened with an attack by the English and Dutch on the French left, the troops wading rather than marching to the assault. Ramillies itself was also assailed, but in vain, and the reply was the rout of some Dutch cavalry. Encounters between the

horsemen, a contingent of Danes being on the English side, ended in the discomfiture of the French.

Meanwhile Marlborough had made movements that decided the day. Having assaulted Franquenay the Dutch infantry stormed Taviars, the other village held by the French, but the decisive stroke was effected when the English centre was strengthened. Charging forward, the infantry there broke through the French line about Ramillies. The Dutch had turned the right, so the enemy broke and fled. Nearly all the French artillery was captured, and they lost about 15,000 in killed, wounded, and prisoners. English and Dutch losses were under 4,000.

Ramleh. Town of Palestine. It is 22 m. W.N.W. of Jerusalem on the main road to Jaffa, with a branch to Ludd, and on the rly. from Jerusalem to both those places. The chief mosque was originally a church built by crusaders. Ramleh was occupied by the British in 1917. Population est. 15,160.

Rammekens. Fortress on Walcheren Island, Netherlands. Situated on the dykes 3 m. E. of Flushing, it formed part of the defences covering the entrance to that port. During Allied operations in the Second Great War to free the Scheldt estuary and open the port of Antwerp, Rammekens was attacked by the R.A.F. on Oct. 7, 1944, the dykes were breached, and the Germans in the area were marooned by the resulting floods. In Sept.-Oct., 1945, the breaches were filled with concrete Phoenix caissons, some of them raised from Mulberry Harbour (*q.v.*).

Ramnagar. District and town of Madras state, India. The district lies inland from Palk Bay and the Gulf of Manaar, and is drained by the Vaigai river, alongside which runs the rly. from Madura to Rameswaram Island. The chief crops are rice, native food grains, pulses, and cotton. The town contains the palace of the raja of Ramnad, whose title of Setupati means Lord of the Bridge, i.e. Adam's Bridge. Area of dist., 4,851 sq. m. Pop., dist., 1,979,643; town, 21,400.

Ramnagar. Town of the Uttar union, India, in Benares dist. It is situated on the right bank of the Ganges, almost opposite Benares. It contains the palace of the maharaja of that city.

Ramon, GASTON (b. 1886). French bacteriologist. He attended the lycée de Sens and the veterinary school at Alfort, and in

1911 entered the Pasteur institute in Paris, of which he was successively assistant chief of laboratories, head of the research department, and assistant director. The anatoxines he devised for vaccination against diphtheria and tetanus were universally adopted, as several immunities could be achieved with a single operation.

Ramón y Cajal, SANTIAGO (1852-1934). Spanish neurologist, born May 1, 1852. Graduating from Saragossa in 1873, eight years later he became professor of anatomy at Valencia, and in 1886 professor of histology at Barcelona. Transferring thence to Madrid in 1892, he earned a world-wide reputation by his researches, receiving half the Nobel prize for medicine in 1906. He wrote extensively in French and Spanish. He retired in 1922 and died in Madrid, Oct. 18, 1934.

Ramoth-Gilead. Name signifying the heights of Gilead (*q.v.*), where Ahab was slain (2 Chron. 18); also a city of refuge (*q.v.*).

Rampant. Term in heraldry. A four-footed beast or monster, represented as standing on its hind



Rampant in heraldry

legs, pawing the air, and with jaws open, is said to be rampant. But a horse in this position is often described as *forcené*, or *efrené*, the nostrils being dilated, and the eyes of a different tincture from that of the body, and so said to be *animé*. See Heraldry.

Rampart. Wall of defence used either in permanent or in field fortification. Ancient and medieval forts had a wall of masonry strong enough to resist a battering ram for a long time, and broad enough to form a platform for the defenders, from which they could discharge missiles. In field works a rampart is usually a bank of earth, sometimes supported by masonry; it is generally protected in modern warfare by sandbags. See Castle; Givet illus.

Rampion

(*Campanula rapunculid*). Perennial herb belonging to the family Campanulaceae. It is a native of Europe, W. Siberia, and N. Africa. It has a thick, fleshy root. The lower leaves are



Rampion flowers

stalked and oval, the upper stalkless and very slender. The blue flowers are much like those of the harebell (*C. rotundifolia*), but form a many-flowered, long spray. The root is edible, and the plant is frequently cultivated for its sake.

Rampur. Town and former state of India; the state is now merged in the Uttar union. The former state is situated adjacent to the Himalayan foothills, with Moradabad dist. on the W., and Bareilly dist. on the E. The town is on the rly. between Moradabad and Bareilly; it has manufactures of pottery and jewelry. Area, 893 sq. m. Pop., state, 464,919; town, 89,322.

Rampur-Boalia OR RAJSHAHI. Town of E. Bengal, Pakistan, in Rajshahi dist. On the right bank of the Padma distributary of the Ganges, it is the district headquarters. It contains a college and an old Dutch trading factory. Pop. 40,778.

Ramsay, ALLAN (1686-1758). Scottish poet. Born Oct. 15, 1686, at Leadhills, in Lanarkshire, he



Allan Ramsay,
Scottish poet

started his career as a wig maker. He collected and rewrote old Scottish songs and ballads, which were published in 1724 as *The Tea Table Miscellany* and *The Evergreen*. In 1725 he published *The Gentle Shepherd*, a pastoral containing admirable descriptions of rural scenery and marked by genuine poetic feeling. In Edinburgh, in 1726, he opened a bookseller's shop which became a resort for literary figures of the capital, and the centre of a circulating library. He died in Edinburgh, Jan. 7, 1758. Ramsay cannot be regarded as a great poet, and he has a strong vein of coarseness, yet he was a distinct factor in the return to nature, which was to have such full expression a generation or two later. Burns and Scott found inspiration in his work. Consult Allan Ramsay, W. H. O. Smeaton, 1896.

Ramsay, ALLAN (1713-84). Scottish painter. Son of Allan Ramsay, the poet (v.s.), he was born in Edinburgh, and began his art studies in London in 1733. He went to Rome to study further in 1736, and returned to Edinburgh in 1739 and started his career as a portrait painter. About 1757 he came to London, and soon established his reputation by his sound,

if somewhat undistinguished, portraiture; among his sitters were George III and Queen Charlotte, Flora Macdonald, Chesterfield, Hume, Gibbon, and Rousseau. A friend of Johnson, he was well known in intellectual society. He acquired a considerable fortune, spent some years in Italy, and died at Dover, Aug. 10, 1784. Examples of his work are in the National Portrait Galleries in London and Edinburgh.

Ramsay, ARCHIBALD HENRY MAULE. Contemporary British politician. Educated at Eton and Sandhurst, he was commissioned in the Coldstream Guards in 1913, and served in the First Great War. He was Conservative M.P. for Peebles during 1931-45. President of the Right Club, and a member of the British Union of Fascists, he was arrested in 1940 under regulation 18B, and detained at Brixton prison until 1944.

Ramsay, SIR BERTRAM HOME (1883-1945). British sailor. He entered the navy in 1898, and came

into prominence in the First Great War, becoming commander in 1915, and serving with the Dover patrol 1915-19. Flag commander to Jellicoe in 1919, he later joined the staff of the R.N. war college, and commanded H.M.S. Royal Sovereign during 1933-35, when he was promoted to flag rank. He then became chief of staff to Sir Roger Backhouse, and retired in 1938 with the rank of vice-admiral. At the outbreak of the Second Great War he rejoined, and commanded at Dover, being responsible for carrying out the withdrawal of the British army from Dunkirk in 1940, an achievement for which he was knighted. In 1942 he planned the amphibious operations of the Allied landings in N. Africa, and in 1943 those in Sicily and Italy, where he took command. For the greater operation of D-day, 1944, Ramsay was the obvious choice for the naval command. He was killed in a flying accident in France, Jan. 2, 1945.

Ramsay, EDWARD BANNERMAN BURNETT (1793-1872). Scottish author and divine, born at Aberdeen, Jan. 31, 1793. Educated at Durham and S. John's College, Cambridge, he was ordained in the Church of England, and from 1816 to 1824 was a curate in Somerset.

Then he obtained a living in Edinburgh, and in 1830 was appointed incumbent of S. John's church there. Ramsay was dean of Edinburgh in 1846, and until his death was one of the leading figures in the episcopal church in Scotland. He died Dec. 27, 1872. Ramsay's fame rests chiefly upon his *Reminiscences of Scottish Life and Character*, 1858, based on two lectures delivered in Edinburgh in 1857. It is an admirable collection of Scottish stories, often typically humorous.

Ramsay, SIR WILLIAM (1852-1916). British chemist. Born in Glasgow, Oct. 2, 1852, and educated at Glas-



Sir William Ramsay,
British chemist

gow university, he afterwards took courses at the universities of Heidelberg under Bunsen, and Tübingen under Fittig. In 1880 he was appointed professor of chemistry at the then University College, Bristol, and became principal in 1881. He remained at Bristol until 1887, when he became professor of chemistry at University College, London, holding that post until his retirement in 1912. Knighted in 1902, in 1904 he received the Nobel prize for chemistry.

Ramsay's earliest work was in physics; his researches were directed to chemistry by a request from Rayleigh that he would investigate the reason for the difference in the density of nitrogen prepared from the air and by chemical means. This research resulted in the discovery that the nitrogen from the air contains a new element, argon. Searching for other sources of argon, Ramsay discovered in a mineral called cleveite the element helium, the existence of which had previously been detected by spectrum analysis in the sun. Later, in conjunction with Rayleigh (q.v.) and M. W. Travers, he discovered krypton, neon, and xenon, gases which occur in minute quantities in the air.

After the discovery of radium by Pierre and Mme. Curie, Ramsay undertook a number of researches and estimated the molecular and atomic weights of radium emanation. In conjunction with F. Soddy he proved the transmutation of radium into helium. He died July 23, 1916. As a memorial a fund was organized to provide research fellowships and a laboratory of

engineering chemistry at University College, London.

Ramsay, Sir William Mitchell (1851-1939). British archaeologist. Born in Glasgow, March 15, 1851, and educated at Aberdeen, Oxford, and Göttingen, in 1880 he won a travelling studentship at Oxford, and subsequently spent many years in travel in Asia Minor.



Sir William Ramsay, British archaeologist

In 1882 he became fellow of Exeter, and in 1885 of Lincoln, Oxford, in the latter year being appointed professor of classical art in the university. Next year he was a professor of humanity at Aberdeen, a position he held till 1911. In 1928 he excavated at Antioch a triumphal arch of the emperor Augustus and reconstructed an inscription which was found in 280 fragments. His leading works, based on his archaeological researches, include his *Historical Geography of Asia Minor*, 1890; *The Church in the Roman Empire*, 1893; *St. Paul the Traveller*, 1895; *Pictures of the Apostolic Church*, 1910; and *The First Christian Century*, 1911. He died April 20, 1939.

Ramsbottom. Urban dist. of Lancashire, England. It stands on the Irwell, 4 m. N. of Bury, with a station in the London Midland region of British rlys. The industries of the district include calico printing, bleaching, and dyeing, cotton-spinning and weaving, paper making, and engineering. Market day, Sat. Pop. est. 15,000.



Ramsbottom arms

Ramsey. Market town and urban dist. of Hunts, England. It is 10 m. N.N.E. of Huntingdon, and is served by rly. There is an agricultural trade. The beautiful church of S. Thomas à Becket, partly Norman, has valuable objects of interest. There are slight remains of the rich Benedictine abbey founded here about 970. The town has associations with the Cromwell family, to whom the abbey lands passed at the Reformation. Ramsey Mere, once a lake in the fens, is now drained. Market day, Wed. Pop. 5,092.

Ramsey. Market town and seaport of the Isle of Man. It stands on Ramsey Bay, an open-

ing of the N.E. coast, at the mouth of the river Sulby. It is 16 m. N.E. of Douglas, with which it is connected by rly., electric tramway, and bus. An electric tramway runs to the top of Snaefell. A pleasure resort, the town has good sands, a swimming-pool, promenades, and a pier. In N. Ramsey is Mooragh Park with a marine lake, and on Frissel Hill is the Albert memorial tower. Ramsey existed in the 12th century, and has always been one of the most important places in the island. It has steamer services during the season. Market day, Mon. Pop. 4,240.

Ramsgate. Mun. bor., market town, seaport, and watering-place of Kent, England. It is on the E. coast, in the Isle of Thanet, 74 m. by rly. S.E. of London. Steamers go to and from London, and also to various Continental ports.



Ramsgate arms

Two stone piers enclose a fine harbour of refuge, accorded the title of "royal harbour" by George IV, which, dating from 1795, consists of an outer harbour of 42 acres, and an inner harbour. Except that of S. Lawrence, the chief churches are modern. There are the Victoria pavilion, a pier, dance halls, concert halls, two theatres, an esplanade between the E. and W. cliffs, and a marine drive. Ellington Park is one of several open spaces. The industries include fishing and shipbuilding, but Ramsgate is chiefly celebrated as being a popular holiday resort. Broadstairs lies to the N., and Pegwell Bay to the W.

During both Great Wars Ramsgate suffered under enemy attack. In the First it was bombarded



Ramsey arms

from sea and air, and in the Second it was considerably damaged by air raids, though the death roll was not heavy, principally because the town utilised a system of deep shelters, running some distance underground, tunnelled into the chalk at the back of the town, and connected with all the main streets. In 1940 about 80,000 men were landed here at the time of the evacuation of Dunkirk, and later it was used as a naval base. Pop. est. 35,000. See Frith, W. P.

Ramus, Petrus, or Pierre de la Ramée (1515-1572). French humanist, mathematician, and philosopher. He was a native of Picardy. Although his attacks on Aristotle made him unpopular, he was appointed in 1551 professor of eloquence and philosophy at the College of France. In supporting the claims of reason against dogma he anticipated the tendency of modern philosophy, and wrote the first French work on dialectics. He was assassinated during the massacre of S. Bartholomew.

Ramuz, Charles Ferdinand (1878-1947). Swiss writer. Born in the canton of Vaud, he lived there almost the whole of his life, except for years spent in Paris before the First Great War. Poet, essayist, and story-teller of Vaudois folk, he made a name with *Le Petit Village*, 1903, became famous in his own country, France, and Germany, but was little known in England. His most distinguished novels included *Passage du Poète*; *Beauté sur la Terre*; *La Guerre dans le Haut-Pays*. *Présence de la Mort* was translated into English as *The Triumph of Death*, 1946. Ramuz died May 24, 1947.

Ranavalona Manjaka III (1864-1917). Queen of Madagascar, 1883-96. After her accession at nineteen, in accordance with the custom of the island, she married her prime minister, Rainilaiarivony. She led a mean



Ramsgate, Kent. The beach and promenade, seen from the pier, looking east

and secluded life in her palace at Antananarivo, but efforts to assert her



Ranavalona,
Queen of Madagascar

She died May 23, 1917.

Rancagua. Town of Chile, capital of the prov. of O'Higgins. On the Southern rly., it is 165 m. S.E. of Valparaiso and 51 m. S. of Santiago, to which there is a good motor road. It is the centre of an agricultural district, and there are mines near. Pop. 38,423.

Rance. A river of Brittany, France, in the dept. of Côtes du Nord. It rises near the peak of Bel Air, and flows first E., and then N., to a long estuary at the mouth of which stands St. Malo. Small steamers ascend to Dinan; the picturesque lower course is canalised, and is connected by canal from Evran with the Vilaine at Rennes. Its length is 50 m.

Rancé, ARMAND JEAN LE BOUTILLIER DE (1626-1700). Founder of the Reformed Trappist Order. He was born in Paris, and became a protégé of Richelieu, who made him canon of Notre Dame and later prior of Boulogne. He was afterwards in high favour with Mazarin, and spent his time at court till in 1662 he retired to the monastery of La Trappe in Normandy, where he reformed the order and instituted a severe regime of discipline. He was the author of an Explanation of the Rule of St. Benedict and Moral Reflections on the Four Gospels. See Trappists; consult The Thundering Abbot, H. Brémond, 1930.

Ranch (Span. *ranch*o, mess-room). Cattle farm on a large scale which makes use of extensive natural pastures. Ranching as an industry began with the Spanish settlers in the New World, and gradually spread into the prairie region of the U.S.A., also into

Canada. The *estancia* of S. America and the station of Australia and New Zealand are virtually ranches. The improvement of stock contributed to the success of the industry, and raising pedigree bulls for S. America proved profitable to British breeders. Better methods of refrigeration also helped development. The S. American *gaucho* and N. American cowboy are typical employees of ranches whose life has become familiar through the "Western" film. See Argentina; Refrigeration.

Ranchi. District and town of Chota Nagpur, Bihar state, India. The district adjoins the Madhya union. Paddy fields cover most of the tilled area. The town is at 2,169 ft. alt. and is the hot weather capital of the province, h.q. of a C. of E. diocese, and a missionary centre. It has a technical college. Area 7,159 sq. m. Pop., dist., 1,675,413; town, 54,178.

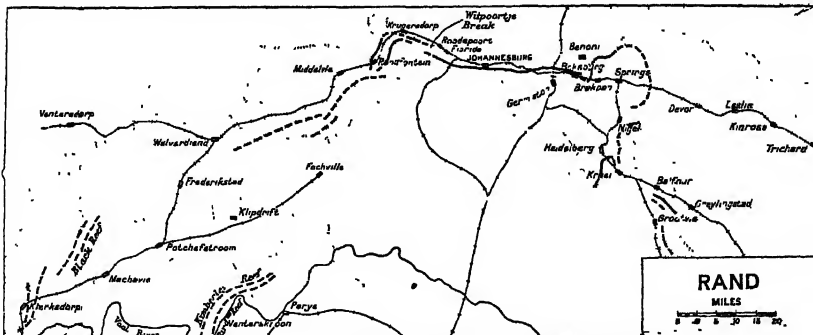
Rancidity. Condition which obtains in oils and fats upon keeping, characterised by a rank unpleasant taste and smell. The change is due to the formation of free fatty acids in the presence of moisture, the process being accelerated by enzymes or organic matter. The rancidity of butter is greatly assisted by the casein left in the fat. The change which takes place in olive oil results in the formation of oleic acid. If fats and oils are protected from light, air, and moisture, they retain indefinitely their state of neutrality.

goldfield, which was proclaimed in 1886. Gold had been found in the locality in 1854; 30 years later a small battery was erected, and quartz mining begun by the brothers Struben. The gold ores are low grade, in more or less horizontal reefs. Deep mining is facilitated by the unusually small rise in temp. experienced as depths increase, only 1° F. for every 212 ft. descended.

In the 1920s the Transvaal was yielding half the gold mined in the world, and by 1940 it was still producing over a third. An output of a million oz. in a month was first achieved in 1938, since when annual output has varied between 12 and 14.4 million oz. Before the Second Great War the annual value was approaching £60,000,000. The Rand refinery was started in 1920 as a private company owned by mining concerns. See Chinese Labour; Gold; Johannesburg; Mining; South Africa; Transvaal.

Randers. Town of Denmark, on the N.E. coast of Jutland. It stands at the mouth of the river Guden at the head of Randers Fiord, 22 m. N.N.W. of Aarhus. Its most prominent feature is a fine 14th century church. It exports corn, butter, eggs, wool, and fish. Pop. 30,254.

Randolph. Noted Scottish family, several of whom were earls of Moray. Thomas, the 1st earl, was a nephew of Robert Bruce. Captured by the English at Methven, 1306, he turned against



Rand, Transvaal. Map showing the goldfields (shaded areas) and the reefs (heavy black lines)

Rand or WITWATERSRAND. Gold mining district in the Transvaal, S. Africa. The ridge extends roughly E. and W. for some 40 m., and its reefs or mineralised beds of conglomerate (banket) consist of quartz pebbles cemented by gold-impregnated silica, iron oxides, etc., and contain, it is estimated, the largest reserve of auriferous ores in the world. Johannesburg is the centre of the

Bruce, but was reconciled and created earl of Moray, 1308. In 1329 he became regent for David II, and he died at Musselburgh, July 20, 1332. His eldest son, Thomas, was slain at Dupplin Moor three weeks later, and his second son, John, at Neville's Cross, 1346. The earldom passed to his sister Agnes Dunbar (c. 1312-69), famed in Scottish history as Black Agnes.

Randolph, EDMUND JENNINGS (1753-1813). American statesman. Born at Williamsburg, Va., Aug.



Edmund Randolph, American statesman

10, 1753, he was a member of congress, 1779-82, and governor of his state, 1786-88. At the Constitutional Convention of 1787 he proposed the Virginia plan, a scheme to establish two houses on a population basis, and expressed himself strongly against a single executive. Although he refused to sign the final draft, he recommended Virginia to accept it rather than endanger the Union, of which he was the first attorney-general, 1789-94. He then became secretary of state, but resigned in 1795 on being unjustly suspected of attempting to obtain money from France as the price of stirring up ill-feeling against Great Britain. He died Sept. 13, 1813.

Randolph, JOHN (1773-1833). American politician, generally known as Randolph of Roanoke. Born at Cawsons, Va., June 2, 1773, he was a descendant of Pocahontas (*q.v.*). He was four times a Democratic member of congress between 1799 and 1829, and senator, 1825-27, when he fought a duel with Henry Clay, whom he had insulted by calling him a blackleg. Randolph gave his own slaves freedom by the terms of his will, and left provision for their support. He died at Philadelphia, June 24, 1833. *Consult* Life, W. C. Bruce, 1923.

Randolph, THOMAS (1605-35). English poet and dramatist. Born at Newnham-cum-Badley, Northants, and educated at Westminster, Oxford, and Cambridge, he was a protégé of Jonson and a minor wit. His plays, which contain many allusions to contemporary life, include *The Muses' Looking Glass*, a defence of the drama; *Amyntas*, a pastoral; and two comedies, *The Jealous Lovers* and *Hey for Honesty*. Randolph was buried on March 16, 1635. His best work was published posthumously; W. C. Hazlitt edited it in 1875.

Ranelagh. Former London place of amusement. At the E. of Chelsea Hospital, its gardens form part of the grounds of that institution. It was named after Richard Jones, 3rd viscount and 1st earl of Ranelagh, who built a house and laid out gardens here, 1690-91; and from 1742 to

1803 rivalled Vauxhall (*q.v.*). A notable feature was the Rotunda, a huge structure resembling the British Museum reading-room. Contemporary writers such as Horace Walpole bear witness to the popularity of the masquerades, concerts, and other entertainments of which Ranelagh was the centre.

Ranelagh was the name given to a London club instituted in 1894, at Barn Elms Park, Barnes, to provide facilities for polo, croquet, golf, and lawn tennis. The Ranelagh in Paris is a grass plot



Ranelagh. The interior of the Rotunda, at this former London place of amusement

and avenue near the Porte de la Muette, which was once the site of a club founded in 1774, and noted for its fêtes.

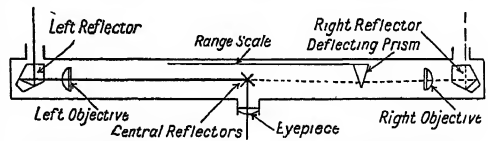
Range-finder. An instrument used to ascertain the distance of a target from the firing point. Various types have been evolved to meet the different conditions experienced in warfare. The majority depend on the principle of measuring the angles of the triangle which is formed by making the target the apex and the instrument the base; and in order to simplify the measurements to be taken it is usual to arrange that one of the base angles is a right angle, leaving only one unknown angle to measure. The instrument is thus actually a goniometer (angle measurer).

A simple instrument of this type was the mekometer (length measurer), used by British infantry, consisting of two reflectors joined together by a cord 25 or 50 yards long. One observer was at each instrument, these being so arranged that the one showed when the

base made a right angle with the imaginary line to the target, and the other could then be sighted on the same object by adjusting a knob which carried a pointer moving over a dial graduated direct in yards instead of angles.

The vastly increased power of modern artillery, making it possible for guns to fire accurately to ranges of 20,000 yards, has naturally demanded equivalent progress in the science of range-finding, and the instruments made by Barr and Stroud, and supplied to the British services, are outstanding examples of modern practice. They are based either on the coincidence or the stereoscopic principle. Essentially these also are dependent on measuring the angles which two beams of light from the target make with the opposite ends of a known base line, and the latter is formed by a rigid metal tube having pentagonal reflecting prisms fixed at each end. These prisms divert the beams of light along the axis of the tube, and through objective lenses also fixed near each end. At the centre of the tube of a coincidence range-finder other prisms divert the beams into a single eyepiece, and are so arranged that the beam of light from the right end forms the upper, and that from the left the lower, half of the field. It is thus obvious that the angles of the prisms must be varied to enable a continuous complete image to be obtained of targets at varying distances from the base.

In practice, especially at long ranges, if the base is made of any convenient length, the angular variations required of the prisms are so small that sufficiently accurate mechanical movement could not be arranged, and, further, the scale would be too fine to be read. These difficulties are obviated by interposing between one of the object glasses and the eyepiece a deflecting prism of small angularity, and definitely fixing the pentagonal prisms in the ends of the tube. By moving the deflecting prism along the optical axis the beam of light is diverted as if the angularity of the pentagonal prisms were altered,



Range-finder. Diagram illustrating principles on which the Barr and Stroud instruments are constructed

but as the motion of the deflecting prism is considerable, an easily read scale can be provided, and the accuracy required of the mechanical adjustment can be attained.

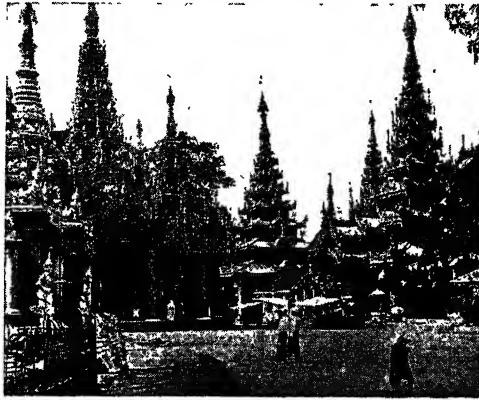
Suitable lenses are also provided for use when required, which

distort a small object, such as a single light, into a vertical line, thus rendering it easy to see when the two half images coincide, and an optical system is also provided for checking the accuracy of the readings. In stereoscopic range-finders the right and left beams of light are diverted into separate eyepieces and a stereoscopic view of the target is obtained.

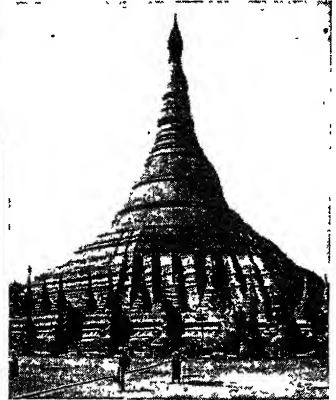
The deflecting prism device is then used to vary the apparent depth of the target relative to a mark in a fixed graticule, also seen stereoscopically, or in some cases to a secondary image of the target. The range is obtained when the target image appears to be at the same distance as the mark or the secondary image. The greater the length of the base, the more accurate are the determinations, especially at long ranges, and for naval and fortress use the instruments have a length between the pentagonal prisms of 9 to 100 feet, while portable range-finders for the infantry have a base of about 28 ins. For A.A. work an instrument was devised on the same principle, giving simultaneous readings of range and height. See Guns; Ordnance.

Ranger. In England, the keeper of a royal forest or park. The office is a royal appointment by letters patent, and it was formerly the holder's duty to range or walk through a forest watching deer, preventing trespassers, and recovering beasts that had strayed. The office is now a sinecure awarded to some prominent person as a mark of royal approbation. The term has several other applications. U.S. army commando units are called rangers. In the girl guide (*q.v.*) movement, ranger is a grade for girls between 16 and 21; sea rangers are a branch equivalent to the sea scouts of the boy scout movement. Princess Elizabeth became chief ranger of the girl guides in 1946. Sporting dogs of the game-seeking type are called rangers.

Rangers. Popular name for the Glasgow Rangers football club, founded in 1873. The ground and registered offices are at Ibrox stadium. Between 1899 and 1939 the club won the Scottish league



Rangoon, Burma. The Shwe Dagon pagoda; left, the entrance, and, right, the main building



championship 23 times (also in 1947) and from 1897 to 1939 the Scottish cup on nine occasions, and were joint holders in 1948.

Rangoon. Capital of Burma (*q.v.*). Built on an ancient site where a city was founded in 746, Rangoon was so called by Alompra when he made it his capital in 1752. The meaning of the name is "end of conflict." It was formerly called Dagon. It lies on the Rangoon river, here met by the Pegu and Pazundaung rivers, about 21 m. from its mouth. There is rly. connexion with Moulmein, Mandalay, Prome, and Bassein, and Rangoon ranks high as a port. It is the main export centre of the great Burmese rice-fields, other exports including teak, raw cotton, petroleum, and hides. Imports are miscellaneous, including cotton, machinery, silk, and sugar.

To the W. of the picturesque Royal Lake lies the famous Shwe Dagon Pagoda, one of the greatest pilgrimage shrines of Buddhism, rising to a height of 370 ft. and magnificently gilded. Traditionally founded in 585 B.C., it has been little altered since the 16th century. The Sule Pagoda in the heart of the town is also notable. Modern buildings include Government House, Jubilee Hall, Anglican and R.C. cathedrals, and other features are the native bazaars, the lakes to the N. of the city, and the remains of the once important city of Syriam. In 1920 a university with two colleges was established. Rangoon college and collegiate school was founded in 1874.

In 1790 an East India Company factory was established in the small stockaded town. It was held by the British in 1824-27, and was rebuilt on a new site by Konbaung Min in 1841. The development of Rangoon since its capture by the

British in 1852 has been rapid; its pop. almost doubled during 1872-91. Frequently bombed by Japanese aircraft, Rangoon was evacuated by British forces on March 7, 1942. It was liberated on May 3, 1945, by Anglo-Indian forces landed from the sea, the Japanese offering little resistance. The port was reopened to shipping about six weeks later, and on Sept. 13, envoys signed here an instrument of surrender of all Japanese forces in Burma. Pop. 400,415. See Burma Campaign.

Rangpur. Dist. and town of E. Bengal, Pakistan, in the Rajshahi division. The dist. is adjacent to Assam and Cooch Behar, and is drained by the Tista tributary of the Brahmaputra. Tobacco is cultivated for trade and export. Jute is an important crop, and 60 p.c. of the area cultivated comprises paddy fields. The annual rainfall is 84 ins. Area, 3,606 sq. m. Pop. 2,877,847. The town, almost in the centre of the dist., has 34,039 pop.

Ranibennur. Town of Bombay state, India, in Dharwar district. It is situated in the S.E. of the district near the borders of Mysore and Madras, and is on the rly. from Bombay across Mysore. Silks and cottons are manufactured. Pop. 13,500.

Ranjit Singh, MAHARAJA (1780-1839). Indian ruler. Born Nov. 2, 1780, in 1797 he assumed the chieftainship of the Sikhs, capturing Lahore in 1799 and Amritsar in 1802. Ambitious to found a Sikh empire, he aroused the suspicions of the British government, which in 1809 bound him by treaty to confine his authority to the N. of the Sutlej. Reorganizing his army with European officers, during the next 15 years Ranjit Singh extended his realm to include almost all the Punjab. He died June 27, 1839.

Ranjitsinhji, KUMAR SHRI,
MAHARAJA OF NAWANAGAR (1872-1933). Indian prince and cricketer.





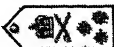


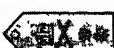


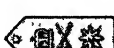






K. S. Ranjitsinhji,
Indian prince

Born at Sardar, Sept. 10, 1872, he was educated in India and at Trinity College, Cambridge. One of the greatest and most attractive batsmen who ever lived, renowned for a glance to leg, in 1895 he became a member of the Sussex cricket team; he had already played for Cambridge, and between 1896 and 1902 represented England against Australia. Heading the averages in 1900, he scored 3,065 runs at an average of 87.57; he also finished top in 1896 and 1904, and in 1899 scored 3,159. In 1906 he succeeded his cousin as maharaja of Nawanagar. "Ranji" provided troops for the Empire in the First Great War, himself serving at the front, 1914-15. Twice a representative of Indian princes at Geneva, he helped to found the chamber of princes. Chancellor in 1932, he spoke in the chamber, on the dangers of federation, just before his death on April 2, 1933. *Consult Life, R. Wild, 1934.*

Rank. Grade or dignity of a number of persons forming a certain class in organized society. Ranks may be loosely differentiated without particular reference to function, as in commonly accepted social distinctions; or formed with strict definition of status and authority, as in ecclesiastical and military organizations.

In the British naval, military, and air services there are two types of rank, commissioned and non-commissioned, and each rank in one service has its equivalents in the other two. The lowest naval rank, ordinary seaman, is equivalent to private, guardsman, trooper, rifleman, fusilier, gunner, signaller, sapper, or craftsman in the army, and aircraftman in the R.A.F. Between private and corporal in the army, between aircraftman and corporal in the R.A.F., is a classification of lance-corporal and leading aircraftman respectively. The lowest non-commissioned naval rank, leading seaman, is equivalent to corporal; while the highest chief petty officer is equivalent to sergeant-major in the army and flight sergeant in the R.A.F. Between corporal and sergeant in the army comes lance-sergeant. In all services a warrant

NAVY	ARMY	AIR FORCE
 Admiral of the Fleet	 Field Marshal	 Marshal of the Royal Air Force
 Admiral	 General	 Air Chief Marshal
 Vice-Admiral	 Lieutenant General	 Air Marshal
 Rear-Admiral	 Major General	 Air Vice-Marshal
 Commodore	 Brigadier	 Air Commodore

RANK. BADGES OF EQUIVALENT RANKS—

officer ranks between commissioned officer and n.c.o.

Sub-lieutenant, the lowest commissioned rank in the navy, is equivalent to second lieutenant in the army and pilot officer in the R.A.F.; while admiral of the fleet, the highest, is matched by field-marshal and marshal of the R.A.F. When an army officer is confirmed in his rank he holds what is called substantive rank. Brevet rank is a temporary higher stage which does not entitle the holder to the higher pay. Temporary rank is usually granted to an officer holding an appointment usually taken by one of higher rank than himself. Acting ranks are a variant of temporary, usually granted to meet situations where an establishment of short duration must be completed quickly.

Honorary rank, frequently granted in territorial and auxiliary forces to civilians, carries the privileges but not the pay of rank.

Officers commissioned in all services in both Great Wars held temporary rank, while all promotions

in commissioned or non-commissioned ranks, even of regular officers, were to temporary rank from the substantive rank held at the outbreak of hostilities. After the war many regular officers and n.c.o.s holding high temporary rank reverted a long way.

In the women's branches of the army and R.A.F., non-commissioned ranks are the same as those for men; and in the W.R.A.C. women's commissioned ranks were in 1950 given the same titles as men's. The W.R.N.S., which is a civilian organization, has its own system of ranks. *See Caste; Nobility; Peerage; Precedence;* also separate entries under the various ranks, e.g. Admiral; Corporal; Flight Sergeant; General; Warrant Officer.

Rank. Military term to describe a formation of men drawn up in a single line and facing front. Until 1936, men fell in on parade in two ranks and then moved into four; today the formation is three ranks, front, centre, and rear, except when the squad has to be sized

NAVY

ARMY

AIR FORCE



Captain



Colonel



Group Captain



Commander



Lieutenant Colonel



Wing Commander



Lieutenant Commander



Major



Squadron Leader



Lieutenant



Captain



Flight Lieutenant



Sub Lieutenant



Lieutenant



Flying Officer



Warrant Officer



Second Lieutenant



Pilot Officer

—IN THE ROYAL NAVY, ARMY, AND R.A.F.

according to height, when they make one or two ranks preparatory to being sized. Each section, front to rear, of a three-rank formation is called a file (*q.v.*), and when the ranks right or left turn to march off the front is in file; the second file covering the first, the third the second, and so on. When marching past in review order, the formation is three ranks in depth, keeping its dressing by the extreme right or left file. The term, in the ranks, is a popular expression to describe the private soldier. The term, rank and file, is used for privates and non-commissioned officers; other ranks refers to privates only. The term applies to any collective body, *e.g.* "In the ranks of death you'll find him."

Rank, JOSEPH ARTHUR (b. 1888). British financier.

J. Arthur Rank,
British financier

Born at Hull, Dec. 23, 1888, he was educated at Leys School, and entered his father's flour-milling firm, retaining a large financial interest in milling. He founded a society exhibiting religious films and developed it to deal with commercial pictures. In 1935 he acquired the General Distributors' company, which became the chief distributing organization for his many film companies, *e.g.* Gaumont-British, Ealing Studios, Odeon Theatres, Gainsborough, Two Cities, and Eagle-Lion. Rank carried out his intention of placing British films on the world market while maintaining a sound moral tone.

Ranke, LEOPOLD VON (1795–1886). German historian. Born Dec. 21, 1795, at Wiehe, Thuringia, he was educated in Saxony, and at the university of Leipzig. Teacher at Frankfort-on-Oder, he wrote there in 1824 his first book, and on the strength of it was made professor extraordinary at Berlin. After three years in Berlin, Ranke went abroad to continue his studies. He was first in Vienna, and then

for three years in Venice, Rome, and elsewhere in Italy, working hard on historical documents. He returned fully equipped for his life-work; in 1837 he became full professor at Berlin, and there he lectured almost until his death. He was made historiographer of Prussia, and died May 23, 1886.

Leopold von Ranke,
German historian

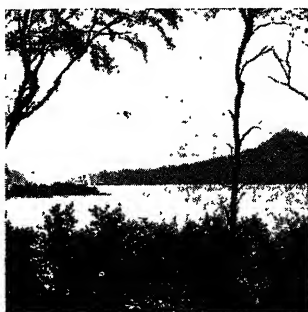
Ranke's works, as collected in 1881, fill 51 vols. The greatest are probably his History of the Popes, and his History of Germany during the Reformation. His History of England deals chiefly with the 17th century, and is especially valuable for its account of the relations between England and other European powers; like the History of the Popes, it has been translated into English. His History of France deals with much the same period. When blind and over 80, he began his History of the World; he carried the story down to the crusades.

Ranke was beyond comparison the greatest historian of his age. He taught his pupils to find the material of their work in nothing less than the original authorities themselves, to examine them critically, to consider the circumstances in which they were written, and the characters of their writers.

Rankin, JEANETTE (b. 1880). First woman elected to the U.S. congress. Born near Missoula, Mont., June 11, 1880, she studied at the school of philanthropy, N.Y., and was a social worker in Seattle. Active in the female suffrage movement before the First Great War, she became the first woman to sit in congress, 1917–19, representing Montana as a Republican. She again sat in congress during 1941–43.

Rannoch. District in the N.W. of Perthshire, Scotland, giving its name to a moor, a loch, and a rly. station. The moor, marshy and desolate, is about 20 m. sq., extending into Argyllshire, and at an average alt. of 1,000 ft.; it figures in Stevenson's Kidnapped. The loch is 9 m. E. to W. and 1 m. N. to S.; it contains two islands, receives the Eicht, and is drained by the Tummel into the Tay. Hydro-electric works are important here. Rannoch station, on the line to Fort William, is 6 m. W. of the loch, at the E. end of which is

Kinloch Rannoch, a stone village and the point from which to climb Schiehallion.



Rannoch, Scotland. The loch from Creaganour

Ranpur. Part of Orissa, India. It was the most southerly of the Orissa feudatory states, on the borders of the Cuttack division. Its area is 204 sq. m. Pop. 51,366.

Ransom (Lat. *redemptio*). The money paid for the release of a prisoner. In medieval warfare it was usual for knights and others of high rank who were taken prisoners in battle to be ransomed, the money being in the nature of a prize for the victor. England paid a large sum for Richard I and France for John II. The practice prevailed until about 1800, when the method of exchanging officers according to rank was substituted. Ransoms were paid to release captured ships and save towns from being sacked.

Ranters. Puritanical sect which flourished during the Commonwealth, 1653-58. Denying the Scripture and all outward manifestation of religion, they taught the presence of God in everything in nature, and were virtually pantheists. After the frenzy of the Commonwealth, the sect died out, but the name was revived about 1850, and given to the Primitive Methodists on account of the style of their denunciatory preaching.

Ranula (Lat., little frog). Cystic swelling on the floor of the mouth due to obstruction and distension of the duct of one of the sublingual or salivary glands. The treatment consists in removing a part of the wall of the cyst, which then disappears. In some cases it is necessary to remove the whole cyst. The swelling is so named from its fancied resemblance to a frog.

Ranunculaceae OR BUTTERCUP FAMILY. Large family of (mostly) herbs, natives of temperate and cold regions. Both leaves and flowers vary greatly in their forms in the numerous genera. The fruit is either a single-seeded nutlet (achene) or a many-seeded pod

(follicle), splitting along one side. The juices of the plants are usually acrid and often highly poisonous. Such well-known genera are included as Clematis, Anemone, Helleborus, Aquilegia, Delphinium, and Aconitum, and the typical genus Ranunculus. See Anemone; Buttercup; Clematis; Hellebore.

Ranunculus. Genus of annual and (mostly) perennial plants, of the above family Ranunculaceae. The most popular wild member, the buttercup, is one of 15 natives of the U.K. Others have been introduced into gardens from abroad at various dates since 1596. The old garden ranunculus (*R. asiaticus*) is tuber-rooted, and should be planted in Feb. in good loam, and well watered. Varieties are innumerable, and flowers of all shades and colours. The roots should be taken up annually in autumn, and stored in sand, in a cool place.

Ranyard Mission. Home mission and nursing society founded in 1857 by Mrs. Ellen Henrietta Ranyard (1809-1879) in the parish of S. Giles, London. It began as a Bible-selling mission in the district known as Seven Dials. Later it opened a lodging house for girls, a medical mission, and a seaside rest home, and developed a home nursing service in S. London. As the Ranyard Nurses, it became part of the L.C.C. district nursing organisation, with its h.q. at 11, Tavistock Street, London, W.C.1.

Rap. Counterfeit Irish copper coin current in the time of George I. It passed as a halfpenny, though intrinsically worth only a quarter of its nominal value. Derived from rapparee, used of Irish armed freebooters, the word survives in the expression "not worth a rap," i.e. valueless.

Rapallo. Small seaport and favourite health resort of the Italian Riviera, in the prov. of Genoa. Sheltered by mountains at the head of the Gulf of Rapallo, 16 m. by rly. E.S.E. of Genoa, it has a castle, now used as a prison, interesting churches (that of S. Martin being damaged in the Second Great War), a zoological garden, and a Roman bridge. In the vicinity is a popular pilgrimage church. Lace and olive oil are the principal products. Tunny fishing is an industry. Pop. 14,000.

Rapallo, TREATIES OF. The first was signed by Italy and Yugoslavia, Nov. 12, 1920. It settled various territorial disputes arising out of the First Great War. By the pact of Rome, April 8, 1918, Italy recognized the unity and independence of the Yugoslav nation,

and the freedom of the Adriatic, but when Yugoslavia occupied Carinthia, Italy demanded the annexation of Fiume, and other places on the eastern Adriatic. (See Annunzio, Gabriele d'; Fiume). By this treaty the frontier between the two nations was fixed, and Italy renounced Dalmatia, but Zara, together with its commune and several adjacent ones, was placed under Italian sovereignty. Both powers recognized the independence of Fiume. Former Austrian or Hungarian subjects within the territories placed under Yugoslavia were given the option of claiming Italian nationality within one year. By this treaty 400,000 Slavs passed under Italian rule. But it finally settled the Adriatic question, giving Yugoslavia possessions on the coast. See Italy; Yugoslavia.

A second treaty of Rapallo was signed by Germany and Russia on April 16, 1922, largely because of efforts by the German foreign minister Rathenau. The two countries cancelled their mutual claims to war indemnities and offered to each other the position of most favoured nation in economic affairs. On Nov. 5 the provisions of the treaty were applied to the new Russian republics.

Rape (Lat. *rapa* or *rapum*, turnip). Cruciferous forage crop which may either take the place of ordinary roots in a rotation or be grown as a catch crop, and is an excellent sheep feed. There are two kinds, the smooth-leaved summer rape (*Brassica campestris*) or dwarf, and the rough-leaved winter rape (*B. napus*) or giant. Swede and turnip are derived from these respectively, but have developed enormously thickened roots. The dwarf variety is suited to calcareous soils, and the giant to heavier kinds, especially those of the fen districts. The method of cultivation and manuring is the same as for turnip, and careful preparation of the seed-bed is necessary. The seed is either drilled (5 lb. per acre) or broadcast (up to 10 lb. per acre). Giant rape is commonly sown in May or June, and is ready to be fed off in the autumn. As a catch crop for providing spring fodder it is put in during July or August. See Brassica; Turnip.

Rape (Lat. *rapere*, to seize). In English law, the carnal knowledge of a woman without her consent. Rape is not necessarily forcible. It may be committed by fraud, e.g. personating a woman's husband. It is punishable by imprisonment for life or a shorter period.

By the Attempted Rape Act of 1948, the attempt has been made punishable by seven years' imprisonment.

Rape. Division of the county of Sussex. It is the equivalent of the hundred in other counties. There are six rapes, Hastings, Pevensey, Lewes, Bramber, Arundel, and Chichester. The rapes are mentioned in Domesday Book. In early times each had its own lord and took its name from his castle. *See* Sussex.

Rape Cake. Artificial feeding-stuff made from rape seed after extraction of the oil. If pure, it is a valuable food for milch cows. Rape cake, ground into rape dust or meal, is also used as a manure, and gives good results with wheat, barley, roots, including potatoes, and hops.

Rape of Lucrece, THE. Poem by Shakespeare in seven-line stanzas, published 1594, and founded on the story, told in Ovid's *Fasti*, of the rape of Lucretia, the wife of Collatinus, by Sextus Tarquinius. She sends for her husband and father, and, calling upon them to revenge her, then kills herself. *See* Lucretia.

Rape of the Lock, THE. Mock-heroic poem by Alexander Pope. First published, anonymously and incompletely, in 1712, it was based on an incident which resulted in the estrangement of two families. Lord Petre had, in the summer of 1711, cut a lock of Arabella Fermor's hair, and it was suggested to Pope by a friend that he should try to effect a reconciliation. The result was *The Rape of the Lock*, of which James Russell Lowell has said that, taken in all, it is the most perfect poem in the language. It gives a wonderful impression of the social life of the time.

Raphael. In the O.T. Apocrypha, one of the seven angels which present the prayers of the saints and go in and out before the glory of the Holy One (Tobit xii. 15). He is represented as being sent to cure Tobit of blindness and to bind the evil spirit Asmodeus (*q.v.*). *See* Angel.

Raphael (1483-1520). Italian painter. Born at Urbino, April 6, 1483, his father was Giovanni Santi, a poet and painter, whose name latinised into Sanctus was in the son's italianised back into Sanzio. His early training was under Timoteo Viti, but when seventeen he went to Perugia, to work in the studio of Perugino, and from the elder artist derived a lasting impression. Later on, he was in Florence, where he made a particular study of the work in sculpture of Donatello and Michel-

angelo, and of the paintings of Leonardo. He also at that time became the intimate friend of the Dominican, Fra Bartolommeo. To this period of his career can be attributed his long series of paintings of the Madonna and Child, and his greater altarpieces. In 1508 he was in Rome, entrusted by Julius II with the decoration of certain rooms in the Vatican. It was then that he painted his great group of



*From a self-portrait
in the Uffizi
Gallery*

Raphaello

the Greek Philosophers, generally known as the School of Athens.

In 1512, Leo X, who had succeeded Julius II, commissioned certain other frescoes, and the work was finished in 1514. One of the artist's most important portrait groups represented this pope with two cardinals. Raphael's designs for the tapestries of the Sistine Chapel were prepared in 1515, and seven of them constitute one of the great treasures of England, and can be inspected at the Victoria and Albert Museum.

Raphael's architectural work commenced in 1514, when he was appointed by Leo X to succeed Bramante as architect of S. Peter's. The position entailed great labour, and he added to it the preparation of a survey of Ancient Rome, cartoons for other frescoes in the Vatican, portraits of many notable persons, and a great picture of the Transfiguration, which he intended should be one of his noblest works. This picture he was never able to complete, only the upper portion of it was from his hand, and he died on Good Friday, April 6, 1520, of fever, which he is believed to have caught when inspecting an ancient monument in the neighbourhood of Rome.

His works are very numerous, and he also left behind him a vast store of sketches. He can best be studied in the Vatican, and in the galleries of Florence, Rome, London, Paris, Dresden, and Madrid. His most popular pictures are the wonderful Madonna de San Sisto, in Dresden; the Madonna della Sedia and the Madonna del Gran Duca in Florence; the St. George and the Dragon in Petrograd; the portraits in the Pitti Gallery in Florence; and the Ansidei Madonna in London. The last named was painted for the Ansidei family of Perugia, about 1506, and bought in 1885 for the National Gallery, which contains, among other examples, a delicate instance of the master's early manner in the small *Vision of a Knight*. His earliest important work under the Perugino influence is the Crucifixion in the Mond collection in London. Raphael's Madonnas, notably the San Sisto at Dresden, are the greatest works of their kind the world has ever seen. No other artist ever painted such Divine tenderness in a woman's face or produced pictures which so fully "create a religious emotion."

Raphael is believed to have painted about two dozen portraits, but some are doubtful attributions, and some are no longer extant. His self-portrait in the Uffizi was probably painted at Urbino in 1506, and his beautiful portrait of an unknown lady in that gallery is of similar date. The impressive portrait of Pope Julius II, in the Pitti Gallery, with replica in the Uffizi, dates from 1511-12, and that of Baldassare Castiglione, in the Louvre, is a well-known portrait which later excited the admiration of Rembrandt and Rubens. His portraits are generally reckoned of secondary importance in his work, but in the best of these Raphael showed in a small compass the same mastery of drawing and power of conveying character as in his greater compositions. *See* Italy; Art; also *illus.*; Angel; Art; Galatea; Gregory VII; Halo; Horace; Jesus; Julius II; Madonna; Painting; etc.

G. C. Williamson

Bibliography. Lives, R. Duppa, 1816; J. A. Crowe & G. B. Cavalcasse, 1882-85; E. Müntz, Eng. trans. 1896; H. Strachey, 1900; J. Cartwright, 1905; E. MacCurdy, 1917; Critical Account of the Drawings of M. Angelo and Raphael, J. C. Robinson, 1870; Schools of Painting in Italy, F. T. Kugler, Eng. trans. 6th ed. rev. A. H. Layard, 1891; Raphael's Madonnas, K. Károlyi, 1894; Raphael in Rome, J. Cartwright, 1895; Raphael, ed. L. Goldscheider, 1941.

Raphia Palm (*Raphia*). Small genus of trees of the family Palmae. They are natives of tropical Africa, Madagascar, and S. America. They have short trunks, but the leaves are frequently of enormous length, and the fact that they are erect causes them to appear much larger in proportion to palms with arching leaves. Those of *R. ruffia*, from



Raphia Palm. *R. taedigera*, the short-timbered variety found in the Amazon region

the Mascarene Islands, are 50 or 60 ft. long, and of feather-form. The flower spikes also are large—six ft. long. Its fruits are as large as eggs of the domestic fowl, covered with smooth, hard, overlapping scales, and containing a single seed. The fruit-clusters weigh 200–300 lb. *R. taedigera*, native of the Amazon region, has leaves of similar length and seven or eight feet wide, whose leaf-stalks, 12 to 15 ft. long, serve many of the uses of bamboos, and cut into thin strips are plaited into baskets. *R. vinifera* (Wine palm), native of W. Africa and the Amazon region, from the similar use made of its leaf-stalks is known as the bamboo-palm. See Africa.

Raphoe. Market town of co. Donegal, Eire. It is 15 m. S.W. of Londonderry. The chief building is the church, formerly a cathedral, dating in part from the 11th century, and there are remains of the bishop's palace. Woollens are manufactured, and in the neighbourhood are raths, mounds, and other antiquities. Raphoe was made the seat of a bishop in the 8th century. The Church of Ireland diocese of Raphoe extends into Donegal, Antrim, Londonderry, and Tyrone; the R.C. diocese covers 26 parishes in co. Donegal. Market day, Sat. Pop. 2,600.

Rapids. Part of a stream's course where the current flows much more quickly than the average, making navigation almost impossible. Rapids are frequently caused by differences in the hard-

ness of the rocks over which a stream flows. Soft layers are cut more rapidly than hard, so that rapids occur where the stream flows from hard to soft layers.

Rapier (Fr. *rapire*). Light, slender sword of highly tempered steel used solely for thrusting. It is about three feet in length, and was a favourite weapon with duellists in the 16th and 17th centuries. The rapier was simplified and developed to its best in Italy, France, and Spain, and in the hands of a well-trained fencer became a most deadly weapon of offence. Its very lightness, backed by strong and supple wrist-play, proved effective against inferior opponents, while the guard remained impenetrable to the most determined attack. The successor to the rapier as a duelling weapon was the shorter small-sword of the 18th century. See Fencing.

Rapin de Thoyras, PAUL DE (1661–1725). French historian. Born at Castres, Tarn, March 25, 1661, he was driven from France by the revocation of the edict of Nantes. He followed William III to England; distinguished himself as a soldier; and was afterwards tutor to the earl of Portland's son. In 1707 he settled at Wesel, and wrote his *Histoire d'Angleterre*, 1724, Eng. trans. 1757–63. He died May 16, 1725.

Rapp, JOHN GEORGE (1770–1847). Founder of the Harmonist sect. Born at Württemberg, Germany, from youthful days he was afflicted with visions in which he thought himself called to purify religion. With a few followers he went to America in 1803, and founded his Harmonist sect at Pittsburg. He taught community of goods and wives, and gathered considerable wealth. After removing the concern to Indiana, he sold it in 1823 to Robert Owen, and founded the colony of Economy near Pittsburg, where he died. See Harmonists.

Rapp, JEAN, COMTE DE (1771–1821). French soldier. Born at Colmar, Alsace, April 26, 1771, he distinguished himself in Egypt, in Italy and at Austerlitz, and in recognition of the part he played as Aspern in 1809 was made a count. He also shared in the Russian campaign, and subsequently defended Danzig for nearly a year against the Russians. In 1814 he made his peace with the Bourbons, but he deserted to Napoleon in the Hundred Days' Campaign and was proscribed. In 1818 his status was restored by Louis XVIII. Died Nov. 8, 1821.

Rappahannock. River of Virginia, U.S.A. Rising in the Blue Ridge, it follows a S.E. course to Chesapeake Bay, which it enters by a wide estuary. It receives the Rapidan, and is navigable to Fredericksburg, about 90 m. from the sea. Its length is 250 m.

Rappard, WILLIAM E. (b. 1883). Swiss political economist. He was born in New York, April 22, 1883, and educated at the universities of Geneva, Berlin, Munich, Harvard, Paris, and Vienna. After being assistant professor at Harvard in 1911, he was appointed professor of political economy at Geneva in 1913. During the First Great War he was engaged in diplomatic missions in the U.S.A., France, and Great Britain, and from 1920 to 1925 acted as director of the mandates section of the League of Nations. Founding the Geneva graduate school of international studies, he directed it from 1928. In 1938 he became chairman of the International Red Cross (*q.v.*). He wrote many books on international affairs, notably *The Geneva Experiment*, 1931; *The Crisis of Democracy*, 1938.

Rapparee. Term derived from an Irish word for a pike. It was used for those irregular Irish troops who assisted James II in his struggle against William III. Afterwards it became a term for a robber.

Rare Earths. Oxides of certain rare metallic elements occurring in nature only in this form. They are found in mineral deposits (usually silicates) occurring in only a few scattered regions of the world, mainly in the Urals, S. India, Scandinavia, Brazil, and the U.S.A. All rare earth metals are in Group III of the periodic table. The main body, 15 in number, forms a series with atomic numbers running from 57 to 71 known collectively as lanthanides. To these are usually added scandium (At. No. 21) and yttrium (At. No. 39). The rare earth elements are as follows:

CERITE GROUP	GADOLINITE GROUP
Atomic No.	Atomic No.
57 Lanthanum	64 Gadolinium
58 Cerium	65 Terbium
59 Praseodymium	66 Dysprosium
60 Neodymium	67 Holmium
61 Itrium (?)	68 Erbium
62 Samarium	69 Thulium
63 Europium	70 Ytterbium
	71 Lutecium
	21 Scandium
	39 Yttrium

The isolation of illinium had not been confirmed in 1948.

Rare earths generally contain several rare earth metals belong-

ing to the same group. The metals are closely similar in chemical and physical properties. The rare earth elements are exceedingly difficult to separate. Fractional crystallisations of salts and double salts are the methods most commonly used and a large number of such crystallisations may be required.

The arrangement of the orbiting electrons in the 15 rare earth elements forming the main body is such that the atoms of all present exactly the same external formation. The electron orbits round the nucleus of an atom form groups corresponding to different energy levels. Starting with that nearest the nucleus, these groups are known as 1, 2, 3, etc. The orbits are elliptical and in each group, except No. 1, there are sub-groups known as $2_1, 2_2; 3_1, 3_2, 3_3$, etc. The large figures and the subscripts denote the ratios of the major and minor axes. Thus in 2_1 , the ratio is 2 : 1; the orbit is an ellipse with one diameter twice as great as the other. But in 2_2 the diameters are equal and the orbit is a circle. Similarly $4_3, 4_2$, and 4_1 are ellipses of greater and greater eccentricity, but 4_1 is a circle.

The full complement of electrons in a group is $2n^2$, where n is the number of the group. Thus in group 1 it is $2 \times 1 \times 1 = 2$; in group 2, $2 \times 2 \times 2 = 8$; in group 3, $2 \times 3 \times 3 = 18$; in group 4, $2 \times 4 \times 4 = 32$. The electron pattern of the lanthanide elements is $2/8/18/32/9/2$.

The most familiar of the rare earth elements is cerium, minute fragments of which become very hot when exposed to air. An alloy of cerium and iron is used for making the "flints" of cigarette lighters. Cerium also plays a useful part in incandescent gas mantles. Thoria (thorium oxide) was formerly classed as a rare earth. It occurs in conjunction with cerium in the earth known as monazite, found in Southern India. It used to be thought that the brilliance of incandescent gas mantles was due to the thoria with which they are impregnated; but when pure thoria was eventually isolated it was found that mantles treated with it produced only a dim light. The addition of a small quantity of cerium causes the mantle to emit a brilliant light.

The list of rare earth elements may undergo a revision. Some have suggested that a new family of rare earth elements may begin with uranium (At. No. 92) and contain neptunium (At. No. 93), plutonium (At. No. 94), americium

(At. No. 95), curium (At. No. 96), berkelium (At. No. 97), and californium (At. No. 98).

Rarotonga. Largest of the Cook Islands, in the Pacific Ocean. Of volcanic origin, it is the most fertile in the group exporting citrus fruits, tomatoes, and copra. The mountainous interior, 3,000 ft., is forested, and a belt of alluvial soil, 1 to 3 m. wide, stretches inland from the coast. It is 20 m. in circumference. Avarua is the seat of administration. The island was annexed to N.Z., 1901. Pop. 5,573

Raschette Furnace. Type of blast furnace formerly used for smelting lead, copper, and silver. It was invented by a Russian mining engineer, Vladimir Raschette, in 1862 and was used first in the Upper Harz region of Germany, and later in America. It was a forerunner of the modern types of blast furnaces in its use of cooling water jackets round the body of the furnace shaft and tuyeres. *See* Furnace; Smelting.

Rashid, ALI EL GAILANI (b. 1889). Iraqi politician. Educated at a Turkish law school, he occupied various ministerial positions during the 1920s, becoming chief of the royal bureau and private secretary to Feisal I in 1932, and prime minister the following year. Minister of the interior 1935-36, he was exiled after an abortive coup, but again became premier in 1940. Sympathy with the Axis led him to refuse a British request that Iraq should sever relations with Italy. Rashid resigned, but, after deposing the regent, Ameer Abdul Illah, re-established himself as premier and instigated a revolt. This collapsed, and he fled to Persia, then to Berlin. In 1942 he was condemned to death in his absence by the Iraqis. After the defeat of Germany in 1945 he was refused admittance to Switzerland, and later arrived at Beirut secretly as a stoker in a French steamship. Then in Saudi Arabia he was given sanctuary, King Ibn Saud announcing that he was regarded as a refugee. *See* Iraq.

Raskolniki. Russian word meaning schismatics, used as a general term for all bodies which dissent from the Orthodox Church. Such sects have been numerous in Russia, most of them dating from the 17th and 18th centuries. Russian dissent is eminently conservative, and usually marks a resistance to some reform or change, often trivial, in the Orthodox Church. Thus sects have arisen over the question of how many times the Hallelujah was to be re-

peated in the service, or how many fingers should be used in making the sign of the Cross.

Rasmussen, KNUD JOHAN VICTOR (1879-1933). Danish explorer. Son of a missionary whose wife was of Eskimo descent, he was born in Greenland, June 7, 1879, and began exploring the Arctic regions in 1902, eventually becoming the chief authority on Eskimo life and language.



Knud Rasmussen,
Danish explorer

He described his early expeditions in *The People of the Polar North*, 1908, and his travels of 1912-20 (into Peary Land) in Greenland by the Polar Sea, 1921. Between 1921 and 1925 he carried out his principal exploration, making an ethnographical survey of the Eskimo people, discovering relics of Franklin's expedition, and reaching Alaska and Siberia. His death was announced Dec. 22, 1933.

Rasp. Coarse variety of file, having separate teeth formed by the use of a pointed punch. The teeth are raised and pointed, so that they are adapted for abrading wood, horn, bone, and similar non-metallic substances. Wood rasps are made in two or three degrees of coarseness, and in flat, half-round, or round sections. The cabinet rasp, for hardwood, is made in two finer cuts, half-round shape. Rasps are used by farriers for trimming horse-hoofs, and by shoe repairers and leather-workers. The horse rasp and shoe rasp are flat and double-ended and have different cuts of teeth at their opposite ends. *See* File.

Raspail, FRANÇOIS VINCENT (1794-1878). French scientist and politician. Born at Carpentras, Jan. 25, 1794, he was educated for the Church, but refused to take orders. He studied and taught physics in Paris, and was active in advanced political circles, being president of the Amis du Peuple. He was imprisoned in 1830, and later worked on chemical research, publishing his *Système de Chimie Organique*, 1833. In 1848 he proclaimed the republic in Paris, but was sentenced to five years' imprisonment, 1852. He sat as deputy for Lyons, 1869, and for Marseilles, 1876, and died at Arcueil, Seine, Jan. 7, 1878. His medical researches on antiseptics and the decay of tissues anticipated the discoveries of Pasteur.

Raspberry (*Rubus idaeus*). Shrub of the family Rosaceae. Natives of Great Britain and other European countries, raspberries will thrive in any soil except clay or one that has a clay subsoil. The canes should be planted in autumn or spring, at a distance of two ft. apart, and four ft. between the rows. As they require some support, they thrive best if trained to wires stretched horizontally at intervals of 18 ins. above the ground.

After planting, the canes should be cut down to within six ins. of the ground, and a dressing of well-rotted manure applied to the sur-



Raspberry. Cane in bloom, and, above, fruit (left) and leaf

face of the earth as a mulch. Young canes are produced during the course of the year, but these should be limited to three or four from each parent plant. As fruit is borne only on one-year-old canes, the old wood should be cut away ruthlessly at the end of each season, and the young canes reduced to about one foot in height. The principal disease, raspberry spot, may be dealt with by spraying the canes with a weak solution of copper sulphate, or Bordeaux mixture. Raspberries are shallow-rooting subjects, hence, in preparing ground for their reception, it is always advantageous to keep the best of the soil nearest to the surface. By way of summer stimulant superphosphate of lime or nitrate of soda may be applied, and liberal doses of liquid manure during the period of the ripening of the fruit.

Rasputin, GREGORY (1873-1916). Russian fanatic. Generally called Rasputin, which



Gregory Rasputin, Russian fanatic

means the immoral, his real name was Novikh, and he was born at Pokrovsky, Siberia, the son of a fisherman. He received no education and only in his later years learned to write a scrawling hand.

He began life as a fisherman, but when a very young man became a professional pilgrim and actually acquired the reputation of a saint. In 1905 he was in fashion as a "holy man" in Moscow, and among his devotees were many women, over whom he appeared to exercise a hypnotic power. In the same year he went to St. Petersburg, appeared as the creator of a new religious cult, and gained an influence at the Russian court, which was much increased by the tsarina's belief in his ability to cure and keep cured the tsarevitch, her ailing son. Gradually he acquired a commanding position among the reactionaries or "dark forces," and made and unmade ministers, while continuing the dissolute life which had given rise to the name by which he was popularly known. Banned to Siberia, on his denunciation by Milyukoff in the Duma in 1913, he returned to St. Petersburg soon after the outbreak of the First Great War, was received with renewed favour by the tsarina, and again became a sinister political figure. On Dec. 29, 1916, he was assassinated in Petrograd by some highly placed Russians. Consult Fulöp-Miller, 1932.

Rassam, HORMUZD (1826-1910). Archaeologist. He was born at Mosul, his father being a clergy-

man of the Chaldean Church. Having assisted Layard in his excavations, he studied at Magdalen College, Oxford, afterwards returning to his archaeological work, during which he discovered the palace of Ashurbanipal, at Nineveh. In 1854 he was made British resident at Aden, and in 1864 he was sent to Magdala,

where King Theodore imprisoned him until he was released by Napier's expedition. Later, he worked for the British Museum, in Mesopotamia. Rassam died at Hove, Sept. 15, 1910.

Rasselas. Philosophical tale by Samuel Johnson, published in 1759 with the full title of *The History of Rasselas, Prince of Abyssinia*. It consists mainly of musings and moralisings on human life, linked by the thread of story of Rasselas confined to the Happy Valley, of his attempts to leave it, and of his subsequent wanderings.

Ras Shamra. A north Syrian coast site where excavation by a French expedition during the 1930s revealed a Bronze Age town. A Canaanitish people, predecessors and perhaps ancestors of the Phoenicians, settled here during the third millennium B.C., and their town, Ugarit, soon became an important centre of E. Mediterranean and Asiatic trade. Its maximum prosperity was when Egypt, with which it did much trade, was strong enough to enforce the security of Syria. Among the inscribed tablets found are some with a rudimentary cuneiform alphabet. The chief gods were Dagon and Baal. Groups of foreign merchants settled in the town and in the 13th century B.C. it was dominated by a colony of Achaeans.

Rastatt or **RASTADT**. Town of Baden, Germany. It stands on the Murg, 3 m. from its union with the Rhine, and 14 m. from Karlsruhe. The chief building is the palace, built on the model of the one at Versailles and formerly the residence of the margraves of Baden. A small place then, Rastatt was destroyed by the French in 1689, soon after which the margrave of Baden rebuilt and fortified it. It was, until 1871, one of the strongest fortresses between France and Germany. Pop. est. 14,000.

The peace of Rastatt was a preliminary of the treaty of Utrecht. Made between France and Austria in Nov., 1713, it put an end to the war of the Spanish Succession. In 1797 another peace conference was held here. This had no result, but was notable because two of the French envoys were murdered. The reasons for the crime are obscure. (See Utrecht, Treaty of).

Rastatt was captured from the Germans on April 12, 1945, by units of the French 1st army. After the end of the war it came within the French zone of occupation.



Hormuzd Rassam, archaeologist

Rat. Term applied to many rodents of the family Muridae, which includes the mice, rats, hamsters, voles, lemmings, and many others. The largest group of the rodents,



Rat. Black rat and, above, the brown rat, two British species of the rodent
W. S. Berridge, F.Z.S.

it is world-wide in distribution. Nearly all the animals of this family have naked and scaly tails, narrow incisor teeth, not more than three pairs of cheek teeth in each jaw, and usually live in holes in the ground. The rats proper are found naturally only in the Eastern Hemisphere. Great Britain possesses two species, the black rat and the brown rat.

The black rat is shorter in body than the more familiar brown species, but has a longer tail. Its hair is greyish black on the upper parts and pale yellow below, while in certain of the Channel Islands a bluish variety occurs. The tame white and pie-bald rats, which have probably been bred in a domesticated state for at least two centuries, are said to be descended from this species. The brown rat is a native of Trans-Baikal, and migrated till it reached England about 1730. It is larger and more heavily built than the black rat, and is much more ferocious in disposition, and on reaching Great Britain soon exterminated the older species in most districts.

Rats prefer the neighbourhood of human dwellings and farms on account of the ease with which food may be obtained. They are omnivorous. They are amazingly prolific, several litters of from four to ten young ones being produced each year. Apart from the food they consume, rats do great damage by burrowing and by making holes in drain-pipes. The species of flea which infests rats carries bubonic plague.

The control of rats is now considered a matter of importance, and a campaign was opened in 1943 against the rats in the London sewers—the first of its kind. More than 500,000 were destroyed in the first fortnight. The attack was made in 3,000 miles of sewers.

Under the Prevention of Damage by Pests Act, 1949, local authorities must free their districts from



rats so far as is practicable. Occupiers of land must notify them if rats are on their land in substantial numbers and

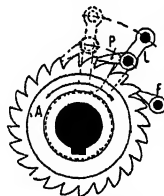
may be legally compelled to destroy them. See Beaver Rat; Pouched Rat.

Rata (*Metrosideros robusta*) OR

IRONWOOD. Tree of the Myrtaceae, a native of New Zealand. It has opposite, glossy, oval leaves, and clusters of bright red flowers. The hard, close-grained wood, useful for shipbuilding, is used by the Maoris for making boat-paddles and war-clubs.

Ratafia. Generic name for cordials or liqueurs made from, and flavoured with, cherries, almonds, apricots, peaches, nectarines, or plums. The crushed kernels as well as the flesh of the fruit are steeped in the spirit, which is afterwards distilled. *Pron.* ratafeeaa.

Ratchet and Pawl. Device which permits one part of a machine to move another, if turned in one direction, without affecting it if turned in the other direction. The ratchet, the part to which power is applied, is provided with teeth, perpendicular on one face, and usually sloping on the other. The pawl is a catch



Ratchet and Pawl.
A. Ratchet wheel.
P. Pawl. L. Pawl operating lever.
F. Fixed pawl or catch

pivoted at one end to the lever, etc., through which power is applied, and suitably shaped at the other to engage the steep faces of the ratchet, against which it is pressed by its own weight, a spring, or some other device. A good example is found in the free-wheel of a bicycle. When this is dragged round by the chain in one direction the pawls engage with the ratchet teeth on the hub of the driving wheel. If it is turned in the other direction, or if the chain wheel is stationary while the driving wheel is running forward, the pawls merely click over the teeth. Another notable

instance is found in the winding mechanism of a clock.

Ratcliffe, SAMUEL KERKHAM (b. 1868). British journalist and author. He early made a name in journalism, being editor of *The Echo* in 1900, and acting editor of *The Statesman*, Calcutta, 1903-06. Later he became well known as a lecturer in the U.S.A., especially on India affairs, and spoke to ethical societies and other organizations in the U.K. Among his numerous books are *The Roots of Violence*, 1934; *The Resurgence of Asia*, 1946.



Rata or Ironwood. Flower cluster and leaves; inset, single flower showing stamens

Ratcliff Highway. Old name of part of The Highway, Stepney, London, E. It runs E. from Upper East Smithfield, continuing to Narrow Street, N. of the London Docks. It was notorious in 1811 for a series of murders which threw London into a panic; they are referred to by De Quincey and Macaulay. Here Charles Jamrach (*q.v.*), founder of the firm of dealers in wild animals, set up in business about 1840. Near by is the church of S. George's-in-the-East, designed by Hawksmoor, completed 1879, rendered derelict by bombs in the Second Great War, and standing in a recreation ground. In Swedenborg Square is the Swedish church, built 1728; in the adjacent Wellclose Square, the Seamen's day schools for children, on the site of a Danish church, 1696-1869.

Rate. Term used in the U.K. for a charge made by a local authority on occupiers of property in its area, the proceeds being used to meet local expenditure. Rates are distinguished from taxes, which are imposed by the state for the purpose of meeting national expenditure. Rates arose when the Poor Relief Act of 1601 made each parish responsible for the support of its poor. The administration of this poor rate was placed in the hands of overseers of

the poor in each parish. The system then set up remained substantially unchanged for more than 300 years, except in London where new rating machinery was introduced in 1869.

The Act of 1601 imposed liability on the inhabitants, parson, and vicar of the parish and every occupier of lands, houses, tithes, coal mines, or saleable underwoods. For long persons were liable on their trading profits as "inhabitants," even though they were not occupiers of any property in the parish; but this liability ended in 1840. By various Acts passed in the 19th cent. all woods and mines, and sporting rights and advertising stations, were added to the list of rateable property until all land and buildings were included. Crown property is exempt.

Valuation of Property

The overseers had to estimate what each occupier of property in each parish could pay, and as a basis they took the annual value of the property—i.e. the sum for which it could be let to a yearly tenant. Until 1862 it was not compulsory to prepare valuation lists. As new local authorities were created with new duties, e.g. public health, they were given power to make a rate for the purpose of raising any money required. By the time of the First Great War the rating system of the country was chaotic. In some parishes no complete valuation list had been prepared for nearly half a century, and there were wide discrepancies between the values placed on similar properties even in the same parish. The provisions for the making of the rate were in equal confusion. The overseers made the poor rate in each parish; C.C.s made a co. rate; and co. bor. councils, urban and rural dist. councils, and other bodies could all make different rates for different purposes.

The increased provision of social services after the First Great War, and the consequent increase in the rates, made these defects more obvious, and the whole rating system was completely recast by the Rating and Valuation Act, 1925, which reduced the number of rates levied to one in urban dists.—the general rate—and two in rural dists.—the general rate and a special rate. The parish ceased to be the unit of rating and the councils of bor., urban, and rural dists. became the rating authorities. Other bodies, such as C.C.s, who required money to meet their expenses were given

power to make precepts to these rating authorities requiring them to raise the money by means of the rates made by them. To secure greater uniformity of assessment, the area of assessment was enlarged. Each co. bor. became an assessment area, and outside these bors. the dists. were grouped into special assessment areas. Valuations were to be made every five years. By the Local Government Act, 1948, valuations were taken out of the hands of the local authorities and placed in those of Inland Revenue officers, appeal being allowed to local valuation courts. This Act sought to equalise the burden of rates throughout the country by permitting grants where necessary from the Exchequer. New lists were to come into force in 1952.

Rates are charged on the rateable value of property, which is calculated from the net annual value, itself in some cases calculated from the gross value. The gross value of land (other than agricultural land) with or without buildings, and of houses and buildings without land (other than gardens), must be arrived at. The gross value of such properties was, until the Local Government Act, 1948, the rent at which the property might be let from year to year on the terms that the landlord paid for repairs and insurance, and the tenant paid the tenant's usual rates and taxes.

Modifications of 1948

The Local Government Act, 1948, altered the basis of calculations for dwelling houses. The gross value of houses built after 1918 by a local authority or housing association was to be arrived at by taking 5 p.c. of what it would have cost to build the house in 1938 and adding to it 5 p.c. of the value of the site in 1938. The gross value of post-1918 dwelling-houses not built by a local authority or housing association, but whose rateable values did not exceed £100 in London or £75 elsewhere in April 1939, was arrived at in the same way, except that the site value in 1949 was taken. This last provision does not apply to a flat or maisonette. The gross value of other houses is to be estimated by reference to the rents being paid for comparable dwelling houses on Aug. 31, 1939, let on the terms that the landlord pays the cost of repairs and insurance and the tenant pays the usual tenant's rates and taxes. For all the above properties a deduction is made from the gross value, varying from 5 p.c. to

40 p.c. of the gross value according to the nature of the property, in order to arrive at the net annual value. This is normally also the rateable value.

The gross value of, e.g., factories, is not calculated, the net annual value being arrived at directly by estimating the rent at which the property might be let from year to year if the tenant paid the tenant's usual rates and taxes and also the cost of repairs and insurance. The rateable value is in this case also usually the same as the net annual value. There are special provisions for calculating the rateable value of properties of a special nature—e.g. gas or waterworks.

Examples of Derating

Another development after the First Great War was the derating of certain properties, i.e. the partial or complete exemption of certain properties from liability to rates with the object of assisting agriculture and industry. In 1928 all agricultural land was derated, and business premises and rlys., canals, and docks were relieved of 75 p.c. of their liability. The Local Government Act, 1948, provided that nationalised rlys., canals, and electricity undertakings should not be rated, but that instead the British Transport commission, the British Electricity authority, and other electrical authorities should annually make payments for the benefit of local authorities, the payment consisting of a fixed standard amount plus a sum varying each year with the average of the rates throughout the country. For England the standard amount paid by, for example, the British Transport commission is £1,810,000, and by the British Electricity authority £11,250,000.

The rates are normally payable by the occupier, but the rating authority may by resolution make the owners of houses of low rateable value liable, and the owners of any houses, whatever the rateable value, may make an agreement with the rating authority to pay the rates.

The year for rating purposes ends on March 31. A rate is payable as soon as it is made, even though it has not been demanded, but proceedings for recovery cannot be taken until seven days after a demand has been made. Rates may be recovered by distress on a warrant from two justices. When there are not sufficient goods to pay the rate the person liable may be im-

prisoned for up to three months by order of two justices if they consider his failure to pay was due to wilful refusal or culpable neglect. A rating authority may reduce or remit the payment of any rate on the ground of the poverty of the person liable. A discount up to $2\frac{1}{2}$ p.c. may be allowed for prompt payment. In London the system of rating differs in some respects.

Ratek OR **RATACK**. Chain of 13 coral atolls in the Pacific Ocean. With the parallel chain of the 11 **Ralek** or **Ralik** atolls, it forms the Marshall Islands. **Ratek** is the E. or sunrise chain, and **Ralek** the W. or sunset one. See **Marshall Islands**.

Ratel (*Mellivora*). Genus of carnivorous mammals, related to the badger, and found in India and S. Africa. Contrary to the usual rule of coloration, their upper parts are light grey and the under ones black. They have stout bodies and short



Ratel. Example of the burrowing carnivore, allied to the badger
W. S. Berridge, F.Z.S.

legs and tail. They live in burrows, and feed by night upon small birds and mammals, and honey.

Rath. Ancient Irish hill-fort. An earthen embankment, usually round, often stake-fenced, it protected, in the larger examples, the residence of a chief and his dependents. Nearly 30,000 remain, and the term enters into 700 place-names, e.g. **Rathlin**, co. Antrim. Naas **rath**, co. Kildare, was the seat of the Leinster kings.

Rath OR **RATHA**. Hindustani name of several monolithic temples at Mahabalipuram, 30 m. S. of Madras, on the Coromandel coast of India. Carved out of granite boulders, presumably in the 7th century A.D., and now deserted Hindu shrines, they are interesting as representing in miniature the Buddhist architecture of their time. See **Mahabalipuram**.

Rathbone, **BASIL** (b. 1892). British actor. Born at Johannesburg, June 13, 1892, he was educated at Repton, and made his first stage appearance in Benson's company at Ipswich, 1911. He toured the provinces and the U.S.A. in *Shakespeare*, and, after serving in the First Great War, established a reputation in a revival of *Peter Ibbetson*, 1920, and as *Iago* in *Othello*. Other

London successes were in *East of Suez*, and *R.U.R.* On the American stage **Rathbone** appeared with *Ethel Barrymore* in *Heat Wave*, 1931, and played *Romeo* to the *Juliet* of *Katherine Cornell*, 1934. He entered films in America in 1925, and was outstanding as *Murdstone* in *David Copperfield*, as *Karenin* in *Anna Karenina*, and as *Sherlock Holmes* in a long series of films.

Rathbone, **ELEANOR** (1873-1946). British politician. Daughter of **William Rathbone** (who helped to found **Liverpool** university), she was born in **Liverpool** and educated at **Kensington** high school and **Somerville College**, **Oxford**. She helped to start the dept.

of social science at **Liverpool** university, and was the first woman member of that city council and first woman J.P. in **Lancs**. A worker in the cause of woman suffrage, in 1929 she became Independent M.P. for the **English** universities; she was returned unopposed in 1935 and elected again in 1945. Family allowances were a strong point in her political programme; she published *The Disinherited Family*, 1924, and *The Case for Family Allowances*, 1940. She died Jan. 2, 1946.

Rathenau, **EMIL** (1838-1915). German capitalist. Born of Jewish parentage in **Berlin**, Dec. 11, 1838, he was trained as an engineer at **Hanover**, **Zürich**, and with an **English** firm. In **Berlin** he started a foundry of his own. This was not a success but after years of wandering over the world, **Rathenau** in 1881 took up **Edison's** incandescent lamp invention, and formed a company to work it in **Germany**; soon he did the same for the telephone, and in 1887 his firm became the **General Electric Co.** **Rathenau** supplied **Berlin** with electric light and various towns with tramways, himself being engineer, merchant, manufacturer, and banker. He died, June 20, 1915. *Pron.* Rah-ten-ow.

Rathenau, **WALTHER** (1867-1922). German politician, son of the above **Emil Rathenau**, whom he succeeded as president of the **General Electric Co.** In the First Great War he was in charge of supplies of raw material. In 1921 he was minister of reconstruction and tried to persuade the Allies to

undertake the economic rebuilding of **Russia**. The treaty of **Rapallo** (q.v.), 1922, was partly his work while foreign minister. On June 25, just as a more tractable mood was appearing in German policy, he was assassinated.

Rathenow. Town of E. Germany, in the *Land* of **Brandenburg**. It is on the river **Havel**, 43 m. W. by N. of **Berlin**, and has possessed urban rights from 1295. It has a church, now Protestant, dating back to the 13th century; and a statue of the Great Elector, who here defeated the Swedes in 1675. One of the centres of the German optical industry, it had engineering works and was a rly. junction and a garrison town. Captured by the Russians, April 27, 1945, it lay after the Second Great War in their zone of occupation. Pop. 45,000.

Rathfarnham. Town of co. **Dublin**, **Eire**. It stands on the **Dodder**, $3\frac{1}{2}$ m. S. of the capital. The chief industries are paper making and corn milling. There is a 16th century castle, long the property of the **Loftus** family.

Rathlin OR **RAGHERY**. Island of N. Ireland. Off the N. coast of **Antrim**, it is 5 m. N. of **Ballycastle**. It consists of a strip of land about 4 m. from W. to E. and a shorter one running S. from the E. end; has a breadth of $1\frac{1}{2}$ m.; and reaches an alt. of 448 ft. S. **Columba** founded a church here in the 6th century, and **Robert Bruce** found refuge on the island in 1306; the remains of **Bruce's Castle** occupy a position in the N.E.

Rathmines. Southern suburb of **Dublin**, **Eire**, having a rly. station. It occupies in part the site of the **Bloody Fields**, scene of the massacres of **English** colonists on **Easter Monday**, 1209. Here on Aug. 2, 1649, **Cromwell's** commander **Michael Jones** defeated **Ormonde**. **Limestone** is quarried. Pop. (**Rathmines** and **Rathgar** urban dist.) 40,000.

Ratibor (Pol. *Racibórz*). Town of Upper **Silesia**, 88 m. S.E. of **Wrocław**, it is situated on both banks of the **Oder**. There are a former ducal palace, the R.C. church of S. Mary (15th century), and a column to the **Virgin** (1723). A rly. junction and shipping centre, **Ratibor** had law courts, theatre, libraries, museum, and industries in electrical engineering, ship-building, hat making, and food production. It was the capital of a small principality of the same name from 1282 to 1532; fell to **Prussia** in 1742; and was subsequently held as a fief by several dispossessed smaller dynasties

which held the title of duke of Ratibor. Overrun by the Russians in Jan., 1945, after the Second Great War it lay in the area of Germany placed under Polish administration. Pop., 1939, 51,729.

Rating. Name given in the British navy to anyone belonging to the lower deck. Sailors are rated as able seamen, petty officers, etc. Hence, obtaining promotion is commonly spoken of as picking up a rate. Rate as applied to a vessel means her classification.

Ration and RATIONING. Terms which originally referred to the fixed daily allowance of provisions assigned to a soldier or sailor for his subsistence. Since the earliest days of organized warfare, compulsory restrictions on the individual consumption of food by civilians have been a common practice amongst besieged communities, but the general rationing of food for civilian populations was first introduced on a national scale by the belligerents in the First Great War. In 1903 the British govt. appointed a royal commission to examine the conditions of food supply and distribution likely to obtain in the event of a major war; in its report in 1905 the majority gave the opinion that no enemy would be able to impose on the British Isles a blockade capable of preventing the adequate import of foodstuffs, but a minority pointed out that there was rarely more than seven weeks' supply of grain in the country at one time.

Before the end of 1914, the First Great War had restricted, even disrupted, the normal distribution and supply of food, and shortages became an acute problem to the belligerent countries. Germany and her allies were obliged to adopt a system of food rationing early in 1915. The British govt. was at first concerned with rationing the armed forces only, but with the intensification of the German submarine campaign in 1916, the food situation became acute, while scarcity and bad distribution led to queueing and discontent. A food controller was appointed, then a ministry of Food (*q.v.*) was set up. In 1917, the govt. took over the supervision of all flour mills, while the food controller exhorted people to ration themselves according to specified amounts. The exhortations being generally futile, it became necessary to institute a comprehensive system of direct rationing. The first commodity rationed was sugar, followed by butter, margarine, lard, meat, ham,

jam, cheese, and tea. Each consumer was given a card containing coupons valid for a specific amount of each rationed food; he had to register with a particular retailer. Prices of all commodities were not, however, fixed by the govt., and much profiteering resulted.

Rationing measures in Great Britain in the Second Great War were more prompt and thorough. For some time it had been appreciated that for rationing to be effective it must be imposed before and not after a shortage had arisen. By 1938 ration books for the whole population had been made ready for issue; the country was split into 18 divisions, each under a divisional food officer. Local committees to a total of 1,500 for England and Wales were made responsible for registering all retailers, regulating supplies, and stabilising prices. Orders controlling stocks, imports, and prices of staple foods were brought into operation in September, 1939, to be extended later to virtually all foods and feeding stuffs. The ministry of Food operated wherever possible in conjunction with or through existing traders.

From January 1940

Rationing began in Jan., 1940, with butter, bacon, and sugar, and subsequently covered, in one form or another, meat, most groceries, sweets, and soap, while distributional allocations were introduced for milk, eggs, imported fruit, and other perishable goods. Every consumer had his ration book, and it was an offence to obtain or supply more than the permitted quantity. The consumer was required to register with a retailer for meat, fats, bacon, jams, sugar, eggs, cheese, and milk. The ministry accepted guidance from experts in nutrition and medical advisers. For some foodstuffs, a system of Points Rationing (*q.v.*) was used. Certain foods, *e.g.* milk, oranges, bananas, and also fuel came under distributional schemes less rigid than direct rationing.

Five types of ration book were issued: R.B.1 (buff), for civilians over 18; R.B.2 (green), for children under school age with special coupons for vitamin foods (cod liver oil and orange juice) and none for tea; R.B.4, the adolescent's ration book (blue), entitling the holder to the same quantities of rationed and controlled foods, except bread and milk, as holders of R.B.1; R.B.6, seamen's weekly ration book; R.B.7, for expectant mothers (grey) with additional coupons for milk, eggs, and cod

liver oil. These books were supplemented by documents, *e.g.* R.B.12, which allowed temporary rations to persons away from home for short periods, service personnel on leave for more than 72 hours, and commercial travellers.

After the war, with the world food situation deteriorating because of war damage, mass movements of population, shipping shortage, and widespread droughts, rationing was retained in Great Britain. Not only were some rations reduced below the wartime level, but foodstuffs which had been purchased freely in the war were rationed: bread during 1946-48, while in 1947 potatoes came under a distributional scheme. (*See Food Control.*)

Food rationing became almost universal in the war, even non-belligerents being affected. All members of the British Commonwealth had their schemes. The U.S.A. rationed coffee and sugar in 1942; other goods were put on coupons. By 1948, however, the U.S.A., the U.S.S.R., Switzerland, Sweden, and Belgium had abolished or eased rationing.

The board of trade introduced clothes rationing in June, 1941, eventually with a special ration book. Goods, including cloth, hand-knitting yarns, garments, and footwear, were listed in a schedule which specified the appropriate number of coupons to be surrendered for each item. The retailer had to give a similar number of coupons to his wholesaler when replenishing stock. After a partial reduction, 1948, all forms of textiles were taken off the ration 1949. *See Petrol Rationing.*

Rationalisation. A term in economics to indicate that production, distribution, and transport methods are applied so as to ensure the minimum waste of effort or materials. It first came into common use in Germany in the period of inflation following the First Great War to denote the organization German industry must accept to survive dissolution. When depression spread to other countries, the term was universally accepted to mean industrial reorganization. In its simpler form, rationalisation of one particular industrial undertaking implies the use of labour-saving and mass-production methods, up-to-date machinery, and scientific research. The clothing, footwear, motor, and radio industries are examples.

In its more complex form, rationalisation entails the amal-

gamation of a group of related industries, setting up common selling agencies, and agreements to fix prices and control output. Theoretically this means bringing the technique and machinery of all establishments in the group to the level of the best, and so ordering their activities that they are able to gauge the present and future needs of the market. In practice, however, a rationalised industry may tend to become monopolistic; the term may be used to justify high prices, control of markets by the manipulation of shares, and elimination of weak opponents outside the combine by underselling. Politically, rationalisation of industry is generally accepted as the capitalist counter to Socialist nationalisation—the distinction between the two systems is that whereas a rationalised industry works for private profit and may have to meet competition, the nationalised industry does not require to make profit, eliminates competition, and may pass its trading losses directly to the taxpayer or indirectly to the purchaser.

Rationalism (Lat. *ratio*, reason). In philosophy, the theory that reason is the chief, if not the only, source of knowledge. It is opposed to empiricism (*q.v.*) and sensationalism (*q.v.*). According to the rationalist, reason is an original faculty which supplies us with concepts and first principles, different from the data of sense, which make it possible to go beyond sensible knowledge and attain the reality of things. While some regard these concepts as innate in the mind, others regard them as immediately discerned by the mind, as intuitive principles.

The rationalism of Kant, while asserting the existence of certain *a priori* (*q.v.*) principles due to reason alone, at the same time admits that reason can know nothing without the aid of experience, beyond the limits of which it can never go. Herbert Spencer, while granting that certain notions such as space and time, are *a priori* as far as the individual is concerned, considers them to be in reality the result of cumulative experience. In theology, rationalism, as opposed to super-naturalism, is the system which interprets all religious belief and dogma in the light of reason, rejecting the authority of tradition and revelation. This line of thought, first systematised by Spinoza, came into special prominence during the struggle between deism and ortho-

doxy, between the supporters of natural and supernatural religion in the 18th cent. See Freethought.

Bibliography. History of English Rationalism in the 19th Century, A. W. Benn, 1906; History of the Rise and Influence of Rationalism in Europe, W. E. H. Lecky, new ed. 1910; History of Freedom of Thought, J. B. Bury, 1913; Rationalism and Humanism, J. A. Hobson, 1933; Man His Own Master, A. Robertson, 1948; Men Without Gods, H. Hawton, 1948.

Rationalist Press Association. Educational and propagandist organization. It was founded in 1899 by C. A. Watts, with 94 members and other subscribers



Rattan. Foliage and fruit

who wished to develop the propaganda of rationalism (*v.s.*) by wide circulation of books at low prices. This aim it achieved, before the First Great War, by the issue of sixpenny reprints of the works of Darwin, Huxley, etc., which circulated in huge numbers, and later by the Thinkers' Library, which has included both the classics of rationalism and new books on scientific and philosophical subjects, specially written for the series. The association organizes lectures and publishes periodicals. By 1947 the number of subscribers was over 5,000. The offices of the association are at 4, 5, and 6, Johnson's Court, Fleet Street, London, E.C.4.

Ratisbon. Alternative (French) name of the Bavarian city now usually called Regensburg (*q.v.*).

Ratitae OR **CURSORES** (Lat. *ratia*, raft; *currere*, to run). Division of the zoological class Aves. It includes a number of flightless birds, such as the ostrich, rhea, emu, cassowary, and apteryx. These all lack the keel on the breast bone to which the flight muscles are attached in the flying birds.

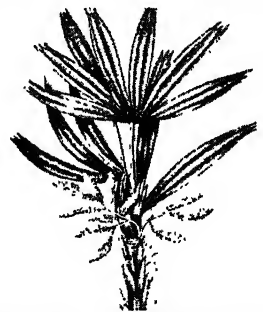
Ratlam. Town and former state of India. The state, now part of Madhya Bharat, is drained by the Mahi river. Its area is 687 sq. m. Pop. 126,117. The town is a

noted opium market, 48 m. W.N.W. of Ujjain, and is a rly. junction for Baroda, Indore, Agra, and Ajmer. Pop. 44,000.

Ratnagiri. Dist. and town of India, in the southern division of Bombay state. The dist. lies along the Arabian Sea, and is comprised mainly of the scarp slopes of the W. Ghats. It is without rlys., but is traversed by a N.-S. road. The annual rainfall is 97 ins. Rice is the chief crop. The town is on the coast, almost midway between Goa and Bombay city, and has a very exposed harbour. Sardine fishing is carried on during the early months of the year. Area, 4,069 sq. m. Pop., dist., 1,373,466; town, 18,500.

Rattan (*Calamus rotang*). Reed-like climbing plant of the family Palmae. A native of India, it has large, arching, feather-like, compound leaves, three or four ft. long. The stems of this, *C. viminalis*, and several other species furnish the "canes" of commerce, used for walking-sticks and basket-work, and, when cut into thin strips, for the seats of cane-bottomed chairs. The stems are only an inch or two in thickness. See Cane.

Rattan Palm (*Rhapis flabelliformis*) OR **GROUND RATTAN**. Dwarf palm of the family Palmae. It is a native of China and Japan. The stems are only about three ft. high, growing in dense tufts, rough with the decayed bases of former



Rattan Palm Head with flower sprays and leaves

leaf-stalks. The leaves, which have long slender stalks, are divided almost to the base into five to seven spreading leaflets.

Rattenbury, JOHN ERNEST (b. 1870). A British preacher. Born Dec. 10, 1870, and educated at Didsbury college, Manchester, he entered the Wesleyan ministry in 1893, later starting a successful mission at the Albert Hall, Nottingham. This was afterwards transferred to the W. London mission (founded 1887) with head

quarters at Kingsway Hall, of which Rattenbury was head during 1907-25. He was also president of the National Free Church Council in 1936. His publications, which mainly concerned the application of Methodism to modern problems, included *Sermons on Social Subjects*, 1908; *Wesley's Legacy to the World*, 1928; *The Conversion of the Wesleys*, 1938.

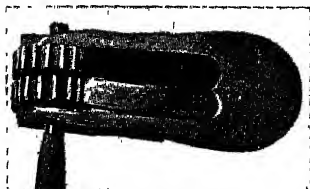
Rattigan, TERENCE MERVYN (b. 1911). British dramatist. Born in London, June 10, 1911, he was



Terence Rattigan,
British dramatist

educated at Harrow and Trinity College, Oxford. He made his reputation as a playwright of wit and originality with *French Without Tears*, a light comedy which, produced in 1936 at the Criterion, London, ran for over 1,000 performances. *Flare Path*, a comedy of the R.A.F., was put on in 1942; *While the Sun Shines*, 1943; *Love in Idleness*, 1944 (acted by the Lunts and produced in New York as *O Mistress Mine*). More serious were *The Winslow Boy* (q.v.), 1946; *The Browning Version*, 1948; *Adventure Story* (about Alexander the Great), 1949.

Rattle. Instrument which makes a rattling noise. There are various kinds, from the toy of ivory or basket work given to babies, to that once used as an alarm by watchmen, and later by the police. This has a vibrating tongue fixed in a frame, which slips over the teeth of a ratchet



Rattle, formerly used as an alarm by police and watchmen

wheel whirled round, making a loud noise. In the Second Great War a rattle was to be used by Civil Defence wardens to give warning of a gas attack from the air.

Rattles. Name applied to plants of three distinct genera—*Rhinanthus*, *Bartsia*, and *Pedicularis*. It belongs properly to *Rhinanthus crista-galli* (yellow rattle), an annual herb of the family Scrophulariaceae, native of Europe, N. Asia, and N. Africa. It is parasitic on

roots, and has lance-shaped round-toothed leaves, and yellow flowers. The inflated calyx remains when the contained seed-capsule is ripe, and, if the plant is brushed against, the seeds make a rattling noise.

Rattlesnake (*Crotalus*). Genus of venomous snakes. It includes about 20 species, all natives of America, mostly of N. America. Like the vipers, to which they are allied, they possess fangs, certain teeth in the front of the upper jaw so rolled upon themselves as to provide a groove down which the poison flows into their wounded victim. In most species the coloration is of a protective character, and their movements when hunting are stealthy. Apparently opposed to this retiring disposition is the possession of the characteristic "rattle" terminating the tail, whose action warns prey of their presence.

This consists of a series of horny cups loosely, though securely, articulated, so that vibration of the tail by shaking them produces the rattling sound, for which various purposes have been suggested. One of its uses—as a sexual call—appears to have been verified, and answering rattles have been heard; but when the snake is hunting it is silent. The most dangerous species is *Crotalus* of N. America, and *C. horridus* of the E. United States. An alternative name for the genus is pit-vipers, suggested by a hollow between nose and eye due to the formation of the jaw-bone (maxilla). See Reptile; Snake.

Ratray. Part of the police burch of Blairgowrie (q.v.) and Ratray, Perthshire, Scotland.

Rauch, CHRISTIAN DANTEL (1777-1857). German sculptor. Born at Arolsen in Waldeck, he studied sculpture under Valentin and Ruhl while valet to the duke of Waldeck. After entering the household of Frederick William III at Berlin, he was enabled to go to Rome. His greatest work was the monument of Frederick the Great at Berlin, unveiled 1851. One may cite also the mausoleum of Queen Louise at Charlottenburg, the Durer monument at Nuremberg,

and statues of the Tsar Alexander, Blücher, and Maximilian of Bavaria. He died at Dresden, Dec. 3, 1857. See Munich; consult also Lives, F. Eggers, 1873-87; and, in English, E. D. Cheney, 1893.

Raudnice or **RAUDNITZ**. Town of Bohemia, Czechoslovakia. It stands on the left bank of the Elbe, 25 m. from Prague. Its castle, built in the 17th century, contains a library of 60,000 vols. and a collection of pictures. The town has some small manufactures. It gave the title of duke to the family of Lobkowitz. Pop. 9,300.

Raunds. Urban dist. of Northants, England. It is 10 m. N.E. of Wellingborough and is served by London Midland region of British



Rattlesnake. 1. Pygmy rattlesnake with young. 2. Texas rattlesnake coiled, with rattle lifted. 3. Rattle of *Crotalus durissus*

W. S. Berridge, F Z S

riys. S. Peter's church has a famous spire, 189 ft. high. It contains some old tombs. The chief industry is the manufacture of boots and shoes. Pop. 4,500.

Rauschning, HERMANN (b. 1887). Danzig politician. He was born at Thorn, W. Prussia, Aug. 7, 1887, and educated at Munich and Berlin universities. After service in the First Great War, he became active in the politics of the then free city of Danzig. He was elected to the Danzig senate as a member of the Nazi party, and was foreign minister of the free city-state government, 1933-34. He was then elected president of the senate, but in 1935 he denounced his party. In 1940 he escaped to Great Britain and afterwards went to the U.S.A., where he wrote such books in denunciation of Nazism as *The Beast from the*

Abyss and The Revolution of Nihilism (both published 1941).

Ravillac, François (c. 1578-1610). Assassin of Henry IV of France. Born at Angoulême, he was a valet and schoolmaster there, later entering a religious order, from which he was expelled. He claimed to have received supernatural visions, and, hearing that Henry IV of France was about to declare war on the Pope, went to Paris and fatally stabbed the king in the rue de la Ferrière, May 14, 1610. He was arrested, red-handed and put to death by torture on May 27, 1610.

Rava Russka. Town formerly in Austria-Hungary, then in Poland, from 1945 in Russia. It is 33 m. N.N.W. of Lvov. An old castle here was later used as a religious establishment. The town gave its name to battles in the First Great War. The best-known was between the Russians and the Austrians, in Sept., 1914, sometimes called the battle of the Grodek line. Rava Russka was included in the Russian zone after the partition of Poland in Sept., 1939, and was occupied by German troops soon after the Nazi attack on Russia in June, 1941. The town was recaptured by units of the 1st Ukrainian army, July 20, 1944.

Ravel, Maurice Joseph (1875-1937). French composer. Son of a Basque mother and Franco-Swiss father, he was born near St. Jean de Luz, March 7, 1875, and studied at the Paris conservatoire, where he was a pupil of Fauré. The overture *Schérazade*, 1899, was one of his earliest orchestral works, and his *Allegro* for strings and harp, 1905, later proved popular. An impressionist, influenced by Debussy, he wrote the music for Diaghilev's ballet *Daphnis et Chloé*, 1909, the ballet opera *L'Enfant et les Sortilèges*; these, and a piano concerto were his main large-scale works. He excelled also at piano compositions, chamber music, and songs. His best known piano works included *Gaspard de la Nuit*, *Jeux d'Eau*, *Pavane pour une Infante défunte*, *Valses Nobles et Sentimentales*, and *Le Tombeau de Couperin*, the last three being later scored for orchestra. His other works included *Ma Mère l'Oye*, *La Valse*, and his most popular piece, *Boléro*. Ravel had



Maurice Ravel,
French composer

the restraint and detachment of the classic school marked by great originality of harmony. He was made director of the Conservatoire Américain at Fontainebleau in 1934. He died Dec. 28, 1937. *Consult* Lives, M. Roland, 1945; N. Demuth, 1948.

Ravelin (Ital. *riellino*). Entrenchment having two faces forming a salient towards the enemy. It is generally used in front of that part of the fortification which has a straight face, but affords a certain amount of flanking and enfilade fire against attacking troops. *See* Fortification.

Raven (*Corvus corax*). Large bird of the crow family. It is found throughout the N. portions of both hemispheres. Its plumage is black with purple reflections, and it is about 25 ins. in length. The beak is notably strong and massive. The raven was formerly c o m m o n



Raven, a bird of
the crow family

throughout Great Britain, but is now found only in mountainous and secluded districts, more especially about the N. shores of Scotland and in the western islands. A few pairs still breed on the rocky coasts of S.W. England and in Wales. This is a powerful bird on the wing and soars high in the air, but it rises from the ground in a slow and flapping fashion.

It begins nest-building in Jan. choosing for the site a ledge on some inaccessible cliff, though occasionally the nest has been found in a tree. The same nest is used year after year, and the birds pair for life. The raven is omnivorous; and all kinds of animal food, eggs, fruit, grain, insects, and grubs are readily devoured. Small lambs and rabbits are sometimes attacked and eaten, but usually only sickly or injured animals are chosen. In captivity the raven makes an intelligent, amusing, but mischievous pet, like Grip in Barnaby Rudge. *See* Eggs colour plate.

Raven, Charles Earle (b. 1885). British theologian and naturalist. Born July 4, 1885, he was educated at Uppingham and Caius college, Cambridge. Ordained in 1909, he became dean and lecturer in theology at Emmanuel college, Cambridge, a position he occupied until 1920. After holding canonries and chaplaincies and being chancellor of Liverpool, he was chosen regius professor of divinity at Cam-

bridge, 1932, and was master of Christ's college from 1939. Apart from his scholarly theological works, Raven was a writer on natural history, e.g. *English Naturalists from Neckham to Ray*, 1947, was awarded the James Tait Black prize. War and the Christian, 1938, was a timely essay.

Raven-Hill, Leonard (1867-1942). British artist. Born at Bath, March 10, 1867, he was educated at Bristol grammar school, and studied art at Lambeth and in Paris under Bouguereau. He first exhibited at the Salon in 1886 and at the R.A. in 1889.



L. Raven-Hill,
British artist

Art editor of *Pick-me-up*, then of *The Butterfly*, which he founded in 1893, he first contributed to *Punch* in 1895, and acted as "second" cartoonist from *Sam-bourne's* death in 1910, until he retired in 1935. With keen sense of character and design, owing much to the influence of Keene, he illustrated Kipling's *Stalky and Co.*, and his last picture in *Punch* showed in colour Kipling as the *Empire's* laureate. Raven-Hill excelled in sporting and boating scenes. He died at Ryde, March 31, 1942.

Ravenna. Prov. of N.E. Italy, in Emilia, and bordering on the Adriatic Sea. A fertile plain, it is low-lying in the coastal district, and marshy in the N. Well watered by streams flowing from the Apennines and intersected by canals, it produces rice, hemp, cereals, oil, wine, and chestnuts. The manufactures include faience ware, glass, paper, silk, linen, and leather articles. Its area is 715 sq. m. Population 284,500.

Ravenna. City of Italy, capital of the prov. of Ravenna. It stands in a marshy plain, between the rivers Fiumi Uniti and Lamone 6 m. from the Adriatic, 44 m. by rly. E.S.E. of Bologna. It is still surrounded by old walls which were once washed by the waters of the Adriatic. Of very ancient origin, it is second only to Rome, in the importance of its early Christian art, unrivalled in the West as a place for studying Byzantine culture, and for 350 years was virtually the capital of Italy. Its archbishopric was founded in 493, and its cathedral dates from the 4th century. Other old churches are those of S. Giovanni Evangelista, dating from 425; S. Vitale, 520; S. Apollinare in Classe, 535;

S. Apollinare Nuovo, 500; the mausoleum of Galla Placidia, 440, notable for its mosaics; the Orthodox Baptistery, 450. The old city castle, partly demolished in 1735, is in the N.E. quarter.

Except S. Vitale, all the churches named were damaged by bombs in 1944, for Ravenna was near the Gothic Line and was taken Dec. 4, 1944, by British and Canadian troops of the 8th army. S. Apollinare in Classe was also shelled by the retreating Germans. But the mosaics of Justinian's and Theodora's time and other works of art almost entirely escaped damage.

Of the important Roman structures nothing now lies above ground. Deserted by the sea and shrunken from its former greatness, Ravenna contains a museum of Roman and Byzantine antiquities, the tomb of Dante, and a valuable library. Manufactures include musical instruments, silk, lace, glass, and wine.

In this famous fortress, protected by marshes, Honorius sought refuge from 404. Odoacer held it for three years against Theodoric, and in 539 it was once more captured by Belisarius. Ravenna was the seat of the exarch of the Eastern emperor until 750. Later it was held by Venice and the popes, remaining under the sway of the latter until 1859, when it became Italian. Near the town is an obelisk to the memory of Gaston de Poix, who fell in battle here after defeating the papal and Spanish forces on April 11, 1512. Byron lived here with the Countess Guiccioli. See Darte.

Ravensbrück. Nazi concentration camp in the former province of West Prussia. Reserved for women, it was the scene of torture, experimentation, and extermination. In 1946 the camp leaders and a number of assistants, male and female, were sentenced by an Allied tribunal to death, or to long terms of hard labour.

Ravensburg. County town of Württemberg, Germany. It stands on the Schussen, 11 m. N.N.E. of Friedrichshafen, consists of the old town and modern suburbs, and is encircled by



Ravenna, Italy. The cathedral, which dates from the 4th cent. Above, interior of S. Apollinare Nuovo, dating from 500

medieval fortifications. The most important buildings are Our Lady's church, 14th century, the 14th century Rathaus, and the Veitsburg tower, which stands on the site of the old castle of the Guelphs. The industries include weaving and dyeing, and there are

manufactures of machinery, paper, stained glass, and a trade in wine, wood, and cattle. Ravensburg belonged to the Hohenstaufens in 1180, became a free city 1276, and passed to Württemberg 1810. In 1945 it came within the French occupation zone. Pop. 24,100.

Ravenscar. Seaside resort of the N. Riding of Yorkshire, England. Formerly known as the Peak, it is set on a plateau above crags of 600 ft., forming the S. spur of Robin Hood's Bay. Its only large building is an hotel with ornamental gardens, and there is a golf course. There is a rly. station on the Scarborough-Whitby line.

Ravenscourt Park. London district and park, in the W. of the bor. of Hammersmith. The park, 32½ acres, from which the dist. takes its name, was in 1887 acquired by the local vestry and met. board of works for £58,000, and passed under the control of the L.C.C. in 1889. Since 1887 about one acre has been added. E. of the ornamental lake was Ravenscourt Mansion (destroyed in 1941 by a German bomb), an 18th century successor to the ancient manor house of the manor of Paddenswick or Palingswick, a gift of Edward III to his favourite,

Alice Perrers or de Windsor (d. 1400), and commemorated in the name of the adjacent Paddenswick Road. The park has an avenue of flowering cherries leading from the King Street entrance, a bowling green, tennis courts, children's playground, and an old English garden, containing every flower mentioned in Shakespeare's works. Close to the park is the Royal Masonic Hospital, opened, 1933, by George V. Ravenscourt Park gives its name to a London Transport rly. station.

Ravenspur. Ancient seaport of Yorkshire. It stood near Spurn Head, and in the 14th century was a prosperous seaport. It was represented in parliament, and here, in 1399, Henry IV landed. Soon, however, the sea began to encroach, and by 1500 the place had disappeared.

Ravenswood. Town in Kennedy district, Queensland, Australia. It is the terminus of a short branch line from the Townsville-Cloncurry rly., is 78 m. S. of Townsville, and the centre of one of the smaller goldfields, dating from 1870.

Ravensworth. Village of Durham, 3 m. S. of Newcastle-on-Tyne. Here is Ravensworth Castle, the seat of Baron Ravensworth. It was built early in the 19th century on the site occupied by an earlier castle.

Ravi. River of the Punjab, forming in part of its course the boundary between W. Punjab (Pakistan) and Punjab (India). About 450 m. long, it rises near the Rotang Pass in Kangra and flows N.W. through the Indian state of Chamba, then S.W. to join the Chenab about 35 m. N. of Multan. At Lahore the Ravi is spanned by road and rly. bridges. It provides much of the water for the Upper Bari Doab canal. On the right bank opposite Lahore are the tombs of the emperor Jehangir and Noor-jahan, his wife.

Ravilious, ERIC (1903-1942). British artist. Educated at Eastbourne grammar school, he studied art at the Royal College of Art, where he taught during 1929-38. A fine wood engraver, he illustrated editions for the Nonesuch and Golden Cockerel presses, and made a reputation with printed designs for pottery and engraved ones on glass. In 1937 he designed pottery for Wedgwood, beginning with a Coronation mug. With Edward Bawden he executed murals at Morley College, London. During the

Second Great War Ravilious was an official Admiralty war artist, but was reported missing in 1942, while flying from Iceland.

Rawalpindi. Division and dist. of W. Punjab, Pakistan. The division lies in the N.W. of the province; it is sparsely populated, mainly by Mahomedans. Wheat is the chief crop. The dist. lies W. of Kashmir and W. and N. of the Jhelum. Most of it is a high plateau, much dissected by ravines. Forest covers a large area. Wheat, pulses, and millet are grown. Area, div., 21,381 sq. m.; dist., 2,022 sq. m. Pop., div., 4,700,958; dist., 785,231.

Rawalpindi. Town of Pakistan, in the W. Punjab. It is situated 155 m. N.W. of Lahore, on a tributary of the Sohan, has strategic roads and rlys., and is the most important military cantonment in the N. of the Indian sub-continent. It has rly. workshops, a brewery, and an arsenal. There is extensive trade with Kashmir. In 1849 the Sikhs surrendered here upon their defeat at Gujarat by Gough. Pop. 181,169.

Rawalpindi. A British armed merchant cruiser. The first important naval engagement of the Second Great War was fought on Nov. 23, 1939, between the Rawalpindi, a former P. and O. liner of 16,697 tons, and the German battle-cruiser Scharnhorst (*q.v.*). The Rawalpindi was engaged in contraband control when she sighted the German S.E. of Iceland. An attempt was made to escape under cover of a smoke screen, but a second German vessel was seen to starboard. The Scharnhorst opened fire and presently the second German ship came into action. The Rawalpindi fought gallantly until all her guns had been silenced and nearly the whole ship was ablaze, when she went down with flag flying. More than 260 officers and men were reported missing. For some time it was erroneously thought that the German pocket battleship Deutschland was engaged in the fight.

Rawdon. Part of Aireborough urban dist., Yorks. (W.R.), England. It is 5 m. N.W. of Bradford, with a rly. station. The chief industry is the manufacture of cloth. A Baptist theological college was opened in 1859. The marquess of Hastings took from here the title of the earl of Rawdon, his ancestors having lived at Rawdon Hall, Hedley Verity, England cricketer, was born here. Pop. 4,754.

Rawlings, MARGARET (b. 1906). British actress. She was born

June 5, 1906, at Osaka, Japan. In Oxford she went to the high school and Lady Margaret Hall; and in 1927 went on the stage, playing the lead in *The Doctor's Dilemma*, at Croydon. She married in 1942 (Sir) Robert Barlow. This actress needed an impassioned part or poetic language to do justice to her



Margaret Rawlings, British actress

rich voice and striking personality. She came to the front in 1936 as Kitty O'Shea in *Parnell*, and made successes in *Black Lighthouse*, *The Flashing Stream*, and as Mrs. Dearth in *Dear Brutus*. After six years' absence from the stage—though not from reading poetry—she reappeared in 1947 in *The White Devil*.

Rawlinson, HENRY SEYMOUR RAWLINSON, 1ST BARON (1864-1925). British soldier. Born Feb. 20, 1864, he was the eldest son of Sir Henry Rawlinson (*q.v.*), to whose baronetcy he succeeded in 1895. From Eton he went to Sandhurst, joining the 60th Rifles in 1884 and saw service in India as A.D.C. to Roberts, and in Burma 1886-87. In 1888 he joined Kitchener's staff in Egypt, and in the S. African War served on the staff. He was commandant of the Staff College, 1903-06. and was given command of a brigade, 1907, and a division, 1910. At the outset of the First Great War he was made director of recruiting, but in Sept., 1914, commanded the 7th division, which he led through Belgium to Ypres. At the end of 1915 he was given command of the new 4th army, and was responsible for the main Somme attack of July, 1916.

Early in 1918 he was appointed to the Versailles council, but after the 5th army disaster at St. Quentin in March he returned to the front to command the reorganized 4th army in the final offensives. In 1919 he was created a baron and awarded £30,000. He was c.-in.-c. in India, 1920-25, and died Mar. 28, 1925, when the barony became extinct.

Rawlinson, GEORGE (1812-1902). British scholar. Born at Chadlington, Oxon, Nov. 23, 1812,

he was educated at Trinity college, Oxford. He became a fellow and lecturer of Exeter college, was ordained, and in 1861

was made Camden professor of ancient history. In 1872 he was chosen canon residentiary of Canterbury, and he was rector of All Hallows, Lombard St., London, from 1888 until his death, Oct. 7, 1902.

Rawlinson is chiefly remembered by his great edition of Herodotus, with translation and annotations by himself, and special archaeological and historical dissertations by his brother, Sir Henry Rawlinson (*v.i.*), and Sir J. G. Wilkinson. The translation has been reprinted in *Everyman's Library*. Rawlinson also wrote on Assyria, Chaldea, Babylonia, Media, Persia, Parthia, and ancient Egypt.

Rawlinson, SIR HENRY CRESWICK (1810-95). British Orientalist and diplomatist. He was



Sir H. Rawlinson, British Orientalist

born at Chadlington, Oxon, April 11, 1810, and entered the service of the East India Company in 1827. Six years later he undertook the reorganization of the Persian troops, and devoted his leisure to the study of cuneiform inscriptions. In 1840 he became political agent at Kandahar, and four years later was made consul at Bagdad, where he collaborated with Layard in excavations at Nineveh. Rawlinson's collection of antiquities is now in the British Museum. In 1859 he was appointed minister plenipotentiary to Persia, but retired a year later. He was M.P. for Reigate, 1858, and Frome, 1865-68. He was the author of a *History of Assyria*, and joint editor with his brother (*v.s.*) of Herodotus. He was made K.C.B. on his return from India, and a baronet, 1891. He died March 5, 1895.

Rawnsley, HARDWICKE DRUMMOND (1851-1920). British divine. Born at Shiplake, near Henley, Sept. 28, 1851, the son of a clergyman, he was educated at Uppingham and Balliol college, Oxford. Having been ordained in 1875, he was appointed vicar of Wray, Windermere, in 1878, and of



George Rawlinson, British scholar Elliott & Fry



Lord Rawlinson, British soldier Russell

Crosthwaite, Keswick, in 1883, resigning in 1917. He died May 28, 1920. Rawnsley was known for his efforts to preserve the beauties and associations of the Lake District. He wrote several volumes on the district, some verse, and other books, including *Memories of the Tennysons*, 1900. He was hon. sec. of the National Trust (*q.v.*).

Rawsthorne, ALAN (b. 1905). British composer. Born May 2, 1905, at Haslingden, Lancs, he



Alan Rawsthorne,
British composer

went to school at Southport and was trained at the R.C.M., Manchester. During 1932-34 he was engaged as a musician at Dartington Hall (*q.v.*). In writing for full

orchestra he favoured the form of free symphonic variations, and produced variations for two violins, 1938; symphonic studies, 1939; concerto for piano, 1942, and for violin, 1948; as well as songs and piano pieces.

Rawtenstall. Mun. borough of Lancashire, England. It is 19 m. N. of Manchester, and has four rly. stations. Cottons and woollens, felts and slippers are manufactured, and there are coal mines in the neighbourhood. Owing its growth to the industrial development of the 19th century, Rawtenstall was made a borough in 1891. Pop. 28,587.



Rawtenstall arms

Ray. In physics, line along which light or other radiation is transmitted. It is a line drawn at right angles to the wave-front of an electro-magnetic wave. Radiation of all kinds is sometimes loosely described by the term "rays." Such rays extend from the so-called gamma-rays (wavelength 10^{-9} – 10^{-10} cm.), met with in connexion with the disruption of atomic nuclei, through X-rays (10^{-6} – 10^{-9} cm.), the ultra-violet rays (10^{-5} cm.), the visible spectrum (7×10^{-5} – 4×10^{-5}), and the infra-red (10^{-2} – 10^{-3}), to the long waves known in radio ($10^2 \times 10^5$ cm.). All these rays are identical in structure and speed of propagation, their only difference being in wavelength. See Cosmic Rays; Gamma Rays; Infra-red Radiation; Light; Radio-therapy; Ultra-violet Radiation; X-Rays.

Ray. Name given to many fishes of the elasmobranch order, which includes the sharks, skates, and other forms. In the rays the skeleton is cartilaginous, the body is flattened, and the pectoral fins greatly expanded. See Skate.

Ray, EDWARD (1877-1943). British golfer, born March 28, 1877. He played for England against Scotland in 1906-07-09-10; won the British open championship in 1912 and that of the U.S.A. in 1920; and was captain of the first team to contest the Ryder Cup in 1927. Spoken of at one time in the same breath with James Braid and Harry Vardon, Ted Ray was a pioneer of shots now universally played. See Golf.

Ray or WRAY, JOHN (1627-1705). English naturalist. Born at Black Notley, Essex, Nov. 29, 1627, he was a blacksmith's son. He was educated at Braintree and Cambridge, became fellow and lecturer of Trinity, and was ordained, but in 1662, owing to the Act of Uniformity, resigned his offices and travelled. He wrote accounts of journeys both in Great Britain and abroad, and with his friend, Francis Willughby, made extensive collections of flowers and plants. He died at Black Notley, Jan. 17, 1705. The results of Ray's investigations were published in a number of volumes. The Ray Society was founded in 1844.

Rayah (Arab. *ra'iyah*, peasants, subjects, from *ra'a*, to pasture). Term applied in Mahomedan countries to the unbelieving subjects of a Mahomedan sovereign, who are generally obliged to pay a special tax. In Turkey the rayah are divided into five classes or millets according to their religion, viz. Greeks, Armenians, Armenian Catholics, Latins or Roman Catholics, and Jews. See Ryot.

Rayburn, SAM (b. 1882). American politician. Born in Roanne co., Tenn., Jan. 6, 1882, he went to school in Texas and studied law at its university; he became a well-known lawyer and entered politics as a Democrat. In the Texas house of representatives during 1907-12, he was speaker for the last two years. He sat in congress continuously from 1913, was majority leader from Sept., 1940; minority leader 1947-49; then again majority leader.

Rayleigh. Dormitory town of Essex, England. Between the rivers Thames and Crouch, approximately 8 m. from the sea, it is part of the urban dist. of Southend, and within easy reach of London on the main rly. from Liverpool Street.

The arterial road from London to Southend runs through it. It is mentioned in Domesday Book, and has a moated mound which marks the site of Sweyn's Castle. Pop. 9,000.

Rayleigh, JOHN WILLIAM STRUTT, 3RD BARON (1842-1919). British physicist. Born at Lang-



3rd Baron
Rayleigh,
British physicist

ford Green, Essex, Nov. 12, 1842, he was a grandson of Joseph Holden Strutt, M.P., an Essex landowner, for whose wife the barony was created in 1821. He was educated at Trinity college, Cambridge, being senior wrangler and first Smith's prizeman. He succeeded to the title in 1873. Appointed to the chair of experimental physics at Cambridge and director of the Cambridge laboratory in 1879, he went in 1884 to be president of the British Association at Montreal. He was professor of natural philosophy at the Royal Institution from 1887 till 1905, when he became president of the Royal Society. In 1908 he was appointed chancellor of Cambridge. He died June 30, 1919.

On resigning his chair at Cambridge in 1884, Rayleigh devoted ten years to a study of the atomic weights of gases. His researches resulted in the remarkable discovery that the atmosphere contained several gases till then unknown. At the meeting of the British Association in 1894, he announced the isolation by Sir William Ramsay of one of these, argon, to which afterwards were added neon, krypton, and xenon. In other branches Rayleigh left the enduring mark of his genius, in pure mathematics, hydrodynamics, aeronautics, electricity, etc., and four volumes of his collected scientific papers were published, 1899-1903. A man of wide interests, Rayleigh made a study of spiritualistic phenomena.

He was appointed to the Order of Merit, 1902, awarded the Royal medal, 1882, and Copley medal, 1899, of the Royal Society, and in 1904 the Nobel prize for physics. A mural tablet to his memory was unveiled in Westminster Abbey, 1921. See Argon; Ramsay, Sir William.

Rayleigh, ROBERT JOHN STRUTT, 4TH BARON (1875-1947). British physicist. Born Aug. 28, 1875,

his mother being a sister of A. J. Balfour, and educated at Eton and Trinity college, Cambridge, he



4th Baron Rayleigh,
British physicist

early showed much of the brilliance of his father, the 3rd baron, to whose title he succeeded in 1919. He became F.R.S. in 1905, and did much scientific research, mainly on radium. He was president of the Royal Institution and Emeritus professor of physics at the Imperial college of science. He wrote a life of his father, 1924, and of J. J. Thomson, 1942. He died Dec. 13, 1947, and was succeeded in the barony by his son, John Arthur Strutt (born April 12, 1908).

Raymond, ERNEST (b. 1888). British novelist. Born Dec. 31, 1888, and educated at S. Paul's school and Durham university, he became a schoolmaster in 1908, and in 1914 took holy orders, serving as chaplain in the First Great War. He resigned his orders in 1923. Experiences on the eastern and western fronts provided the basis of some of his many novels. His main successes in fiction were: *Tell England*, 1922; *Daphne Bruno*, 1925; *A Family that Was*, 1929; *The Jestling Army*, 1930; *We the Accused*, 1935; *The Last to Rest*, 1941. An enthusiastic essay was *Through Literature to Life*, 1928. *For Them That Trespass* appeared in 1944.

Raynaud's Disease. Localised intermittent contraction of the blood-vessels in the extremities, causing the fingers or toes to become cold and white, or "dead." It is named after the man who first described it. Attacks may be brought on by exposure to cold or emotional disturbance, and the condition is usually found in nervously unbalanced women. The spasm, which may be associated with severe pain, usually passes off in an hour or two. After repeated and severe attacks, gangrene of the fingers and toes may occur. Frequently the same digits on either side of the body are affected; hence the alternative name, "symmetrical gangrene." Exposure to cold must be avoided, and all efforts made to strengthen the circulation of the blood.

Raynes Park. A district of Greater London. It lies S. of Wimbledon, between Merton Park and New Malden, in the co. of Surrey, and has a rly. station 8½ m. from

Waterloo. The district is largely residential, though there are many light industries.

Raynouard, FRANÇOIS JUSTE MARIE (1761-1836). French author and philologist. Born at Brignoles, Provence, Sept. 8, 1761, he was educated as a lawyer, and became an advocate. He was confined to prison during the Revolution, owing to his Girondist sympathies, and while there wrote a tragedy, *Caton*. His single dramatic success was with *Les Templiers*, at the Comédie Française, 1805. Two years later he was elected a member of the French Academy, and in 1817 was appointed its secretary. In 1818 he began the publication of his *Choix de Poésies Originales des Troubadours*; the sixth and last volume was issued in 1821. His great *Lexique Roman*, a word-book of the medieval Provençal language, was posthumously published in 6 vols., 1838-44. He died at Passy, Oct. 27, 1836. *Consult* *Origin of Romance Languages*, Sir G. C. Lewis, 1839.

Rayon. According to the British Rayon Federation and the Textile Institute, the generic term applied to all fibres for textile use which are not of natural occurrence. Originally there were four main types, based on (a) cellulose nitrate, (b) viscose, (c) cuprammonium cellulose, and (d) cellulose acetate. Of these only the cellulose acetate appeared in the finished fibre form as the ester, all the others being reconverted to cellulose in the course of manufacture. The so-called "nitro" or "Chardonnet" rayon has been eliminated, and to the list has been added a number of man-made fibres based on casein, vinyl polymers and co-polymers, and polyamides. The last are commercially known as nylon (*q.v.*). According to a report published March, 1948, the Tennessee Eastman Corp. of America discontinued the use of the word rayon as a generic term for its cellulose acetate textile fibres: this was the first direct challenge to the Federal Trade Commission ruling which had held since 1937.

In 1910 world production of rayon was about 8,000 tons; in 1941 it reached 1.2 million tons, about 15 p.c. of the total production of all textiles.

Viscose rayon. This is prepared by steeping high grade (spruce) wood-pulp in 18 p.c. caustic soda for 30-90 mins. at 18° C., liquid then being expressed to three times the dry pulp weight. The alkali cellulose is then shredded and ripened at 25°-30° C. for 48 hrs., after which it is treated with carbon bisulphide (2 : 1) at 20°-30° C. This yellow xanthate is finally mixed with 4-6 p.c. aqueous caustic soda to give the orange-yellow solution, which is filtered and forced through suitable platinum alloy spinnerets into an acid precipitating bath at 40° C. The crude fibres thus produced are washed and then treated with hot alkaline solutions (sodium sulphide) to remove the combined sulphur, and "regenerate" the cellulose. The final viscose fibre is thus often referred to as a "regenerated" cellulose fibre.

Viscose rayons are available as bright (unpigmented) or dull (pigmented with titanium oxide), and also as special high-tenacity yarns for tire cords. Normal viscose has a dry tensile strength of 1.6-2.0 grams per denier with an elongation of 15-20 p.c. Loss of tenacity dry to wet may be as much as 60 p.c.

Cuprammonium Rayon. In the manufacture of this form, cotton linters are added to a mixture of ammonia and copper hydroxide with constant stirring, attaining a solution concentration of 15-20 p.c. in one hour without gelation, this being subsequently reduced to 4 p.c. by the addition of water. This solution is filtered, and after the necessary storage, is extruded through spinnerets into a 4 p.c. sodium hydroxide solution at room temperature. The fibres are then stretched before winding, washed, and treated with 1-3 p.c. sulphuric acid to eliminate the non-cellulosic constituents (ammonia and copper), which are recovered. One authority gives 0.57 lb. of ammonia (26° Beaumé), 0.80 lb. 50 p.c. caustic soda, 0.75 lb. copper sulphate, 0.92 lb. cotton linters as essential for the production of 1 lb. cuprammonium rayon. Like viscose, this is also a regenerated cellulose fibre, characterised by its remarkable fineness. Bright and dull fibres are produced. Dry tenacity varies from 1.43 grams per denier (bright) to 1.62 grams per denier (dull), with an elongation of 14 p.c. Wet strength shows a loss varying from 30-50 p.c., with a 10 p.c. increase in elongation.

Cellulose Acetate Rayon. Secondary or acetone-soluble cellulose



F. J. M. Raynouard,
French author

acetate used for the manufacture of rayon is prepared by treating 1 part bleached cotton linters at controlled temperature (0° – 25° C.), with a mixture of 3 parts glacial acetic acid, 2 parts acetic anhydride, and 0.1 part concentrated sulphuric acid, with constant mixing, until the cellulose passes into solution to yield a light yellow syrup. Residual anhydride is then "killed" by the addition of the theoretical amount of water, the temperature rise being controlled according to the solution viscosity required. The syrupy mass is then allowed to "ripen" at 20° – 21° C. for 60 to 70 hrs., or until the required degree of acetone solubility is attained. The cellulose acetate is then precipitated as a flake-like mass by the controlled addition of water, after which it is washed acid free and dried under moderately heated air blast. For the manufacture of fibres the cellulose acetate should be perfectly soluble in acetone, and should have a combined acetic acid content of 54–54.5.

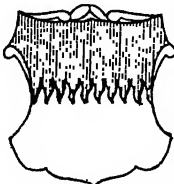
The spinning solution is prepared by dissolving the "flake," usually finely ground and uniformly blended, in pure acetone to give a solution of 20–25 p.c. concentration according to the viscosity of the acetate. This solution is carefully filtered to remove all mechanical impurities, and is then forced through multi-hole spinnerets, downwards, into a heated "metier" case. The filaments thus produced are first oil-lubricated and next given a controlled "twist," and are wound direct on to bobbins. The cellulose acetate fibres are used as produced, as an ester of cellulose.

Occasionally the acetate yarn receives an after-treatment in the nature of a surface saponification for the production of "strong" and "dull" yarns. More usually the latter is attained by the addition of a small quantity of a white pigment to the spinning solution.

The dyeing properties of cellulose acetate rayon differ markedly from those of viscose and cuprammonium: the latter, being pure cellulose, dye satisfactorily with cotton dyestuffs. The commercial development of "acetate" rayon was held up for many years through this difficulty of dyeing, but this is no longer a problem, special dyestuffs having been developed to meet the need. Acetate rayon is more water resistant than the cellulose fibres, and its loss of strength wet/dry is of the order of 12 to 18 p.c.

Cellulose acetate fibres are widely used as warps in the weaving of mixed fabrics with viscose, cotton, etc. This makes possible the production of "effect" fabrics making use of the difference in dyeing properties between the "acetate" and true cellulose fibres.

Rayonné. In heraldry, any charge decorated with rays. The rays are usually of gold, silver, or red, and representing light or flames. The term is also applied to a line of demarcation, composed of a series of rays with wavy outline.



Rayonné in heraldry

Ray Therapy. Treatment of disease by the violet and ultra-violet rays of the spectrum, particularly by the means of what is popularly known as artificial sunlight. It is to the ultra-violet, or actinic, rays that the pigmentation of the skin is due, as well as certain chemical and physical changes in the blood. Direct sunlight gives all these, but also the depressing invisible rays above the ultra-violet. With artificial sunlight it is possible to administer a duly regulated dose of light composed of the desired wave-lengths.

The apparatus consists fundamentally of an arc, formed in open air by an electric current passing between two electrodes, or in mercury vapour enclosed in a quartz tube. The electrodes may be of carbon, tungsten, or iron, or a mixture of these and other elements. The Finsen Light (*q.v.*), used for the treatment of lupus, was the earliest form of ray-therapy apparatus; it was a carbon arc lamp. Mercury arc lamps are air-cooled (for focal or cavity work) or water-cooled (for both external and internal treatment).

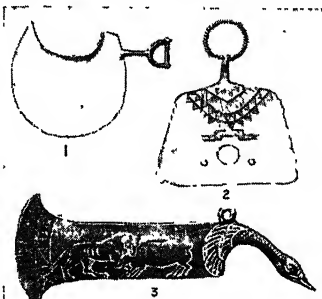
The range of ray therapy is still largely undefined. In the treatment of rickets in young children excellent results have been obtained. The rays convert a substance in the skin (cholesterol) into vitamin D, to the absence of which rickets is partly due. Children receiving daily irradiation are found to grow at an increased rate, and the treatment appears to raise their powers of resistance against infection. Many patients experience an increased sense of well-being, a greater vigour, and a diminished susceptibility to in-

fection by catarrh organisms. But there is difference of opinion as to the effect of irradiation on the blood.

Local applications of the rays to localised lesions have proved useful, the healing of refractory wounds have been speeded, and various skin diseases have improved considerably. Satisfactory results have sometimes been achieved in the treatment of glandular tuberculosis. *See also* Radium; X-Rays.

Razor (Fr. *rasoir*, from Lat. *radere*, to scrape). Keen-edged cutting blade for shaving. The custom of removing hair from the face, either altogether or from certain parts, is one that goes far back in the history of the human race. For this purpose the razor was made, of various materials before the Bronze or Iron ages, a sufficiently sharp edge being ground on flints, shells, or bones.

Early steel razors were first made by swordmakers, and the principle has little altered to the present day. The ordinary open razor comes from a strip of steel forged into a long, narrow wedge with straight sides tapering to a sharp edge. The blade is then shaped on an anvil and its edge ground and sharpened. After the blade has been dry-ground to remove all traces of oxide, it is



Razor. 1. Primitive pattern, bronze. 2. Bronze razor of very early date found in Athens. 3. Early Phoenician, with engraved bronze blade

hardened by heating to a bright red and then plunged in cold water; it is then tempered by further heating and cooling. The edge is next wet-ground on a succession of revolving stones. After polishing with emery powder paste on a wheel covered with a tin-lead alloy, the blade is jointed into a bone, ivory, or celluloid haft. The finished blade is often elaborately etched.

In 1815 the practice was introduced of hollowing out the sides of the razor blade by successive grindings to improve the fineness

of the cutting edge and facilitate resharpening. With the use of grinding wheels of successively diminishing diameters, the modern full hollow-ground razor blade is actually thinner in its centre than near the cutting edge, and can be made to give a resonant ring.

Numerous attempts were made to evolve a razor which would obviate the danger of the user cutting himself, but none proved satisfactory until the introduction of the Gillette early in the 20th century. The principle of this type, as of all safety razors, is to place between the skin and the cutting edge a guard which permits the blade to pass over uneven surfaces of the features without cutting the skin as it removes the hair. Safety razor blades are automatically produced from long strips of thin steel fed into machines. The machines grind and sharpen the strips, punch holes to fit the blade holder, cut the strips into individual blades, and finally grease and wrap each blade separately. Some safety razor blades have a cutting edge on each length; others, thicker, have a single cutting edge, and can be repeatedly stropped. Sheffield, England, has long held supremacy in making ordinary and safety razors.

Dry shavers, i.e. safety razors used without application of lather, are generally electrically operated. Cutters actuated by a small electric motor are fitted into a case that also contains the motor. When the end of the case is placed against the skin, the hairs are cut off by the moving cutters—or in some kinds by a rotating blade. A non-electric dry shaver has a hand-operated prime mover; in another type the blade moves back and forwards across the hairs with a rocking motion imparted by the user. See Beard; Steel.

Razorbill (*Alca torda*). British sea bird of the auk family. It is 17 ins. long in body, and the plumage



Razorbill. British sea bird allied to the extinct Great Auk

is greenish black on the upper parts, brown on the throat, and white below. The beak is very massive, and is flattened laterally; and the bird generally much resembles the extinct great auk, of which it is the nearest living relation. It occurs sparsely around the British coasts. It spends nearly all its time on the water, resorting to the cliffs in the breeding season.

Razor Shell or **RAZOR FISH**. Popular name for the solen, a common bivalve mollusc of which



Razor Shell. The common bivalve, *Solen siliqua*

about five species occur around the British coasts. The shell is long and very narrow. Solens are to be found between tide marks on every sandy beach. They burrow deeply and rapidly into the wet sand.

R.D.X. Abbrev. for the most powerful and widely used of new explosives developed during the Second Great War. R.D. stands for research department. Other names for it are cyclotrimethylene-trinitramine, cyclonite, hexogen, and T4. See Cyclonite; Explosives.

Re. In music: (1) The second of the Guidonian syllables. In Tonic Sol-fa it is the second degree of the major scale, and is pronounced ray. (2) The name of D in France and Italy.

Ré. Island of France. It lies in the Atlantic Ocean, 9½ m. W. of La Rochelle, and is divided into two districts, of which the chief towns are Saint-Martin and Ars. A British expedition under the duke of Buckingham landed here in 1627 in an unsuccessful attempt to relieve La Rochelle. A light rly. runs from Sablanceaux to Les Portes (22 m.) at the N.W. of the island. It is protected from the sea by sea-walls and dunes, and defended by four forts. There are considerable salt marshes and vineyards. It is about 16 m. long and 3 m. broad.

Rea, ALEC LIONEL (b. 1878). British theatrical manager. Born at Liverpool, Jan. 30, 1878, he was educated at London university, and became director of a banking firm. In 1911 he was a director of the Liverpool repertory theatre (Playhouse). Chairman and founder with Basil Dean of the theatrical organization Reandean, and Reandco, the company which succeeded it, and which presented many well-known plays, he was

lessee of the Apollo Theatre, London, from 1937. Rea was deputy director of Ensa, 1939-45, and treasurer of the British Drama League, 1925-45.

Read, HERBERT (b. 1893). British critic and poet. Born Dec. 4, 1893, he was educated at Crossley's school, Halifax, and the university of Leeds. After service in the First Great War, he became assistant principal in the Treasury, a post he held from 1919 to 1922. He was then appointed assistant keeper, Victoria and Albert Museum, continuing until 1931. From 1933 to 1939 he edited the Burlington Magazine. As a critic, Read

was influenced by abstract painting and interpreted the aims of this art form in terms of an intellectual anarchism. His publications included English Prose Style, 1928; The Meaning of Art, 1931; Art and Industry, 1934; Art and Society, 1936; Poetry and Anarchism, 1938; Education Through Art, 1943. His poetry, collected in 1934, was for the most part of the abstract, intellectual kind, taking a secondary place to his art criticism. A study of his work, ed. H. Treece, came out in 1944.

Reade, CHARLES (1814-84). British novelist and dramatist.

He was born June 8, 1814, and educated at Magdalen college, Oxford. He became a barrister, but soon turned to literature. He began with plays, of which the first was produced on the stage in 1851. The best known of them, perhaps, are The Lost Husband, Masks and Faces, 1852 (written in collaboration with Tom Taylor), The Lyons Mail, The Double Marriage, originally a novel, and Drink, 1879, adapted from Zola's L'Assommoir. His reputation was made, however, with his novels, especially The Cloister and The Hearth, 1861, which depicts in realistic manner the life of the 15th century, and is generally regarded as one of the masterpieces of historical fiction. Of the others may be mentioned Peg Woffington, 1852; Christie Johnstone, 1853; It is Never too Late to Mend, 1856, a sensational story of prison life in the early days of Australian colonisation; Hard Cash, 1863, an ex-



Charles Reade, British novelist and dramatist

posure of the abuses of the private asylum; Put Yourself in His Place, 1870; and The Wandering Heir, 1875. The Perilous Secret was published after Reade's death, which took place in London, April 11, 1884. He dramatised several of his novels and wrote short stories and a book on the violin. *Consult* Charles Reade, M. Elwin, 1931.

Reade, WILLIAM WINWOOD (1838-75). A British writer. A nephew of Charles Reade, he was born Dec. 26, 1838, and educated at Hyde House school, Winchester, and Magdalen college, Oxford. He travelled in Africa and did valuable original work in geography, reaching the Niger from the Gold Coast in 1869. In 1873, on the outbreak of the Ashanti War, he returned to Africa as special correspondent of The Times. His health was undermined by this trip, and he died April 24, 1875.

Winwood Reade wrote travel books and novels, but his fame is due to The Martyrdom of Man, 1872. This book, still widely read, was one of the earliest attempts at writing a universal history, and, while imbued with a somewhat gloomy outlook, has been a fertile source of ideas for later writers, being named by H. G. Wells as one of the works which inspired The Outline of History.

Reader. In universities, term applied to certain classes of teachers or lecturers. Sometimes readers assist the professors in their duties, and others teach subjects for which there is no professorial chair in existence. In the Inns of Court, the reader was originally one who lectured on legal questions to his inn; readings on statutes, etc., are extant from the time of Edward I, and are of importance in legal history. The office still survives. *See* Inns of Court.

Reader. One who corrects proofs taken from type before the type is passed for the press. He is also known as a proof-reader, and the London society founded to promote his interests is called the Association of Correctors of the Press. A readers' pension committee was formed in London in 1888 to raise funds for the Printers' Pension Corporation and to assist readers or their widows to election to pensions. Since its foundation it has raised £25,000, founded 51 pensions, and assisted 250 readers or their widows to election to pensions.

The term reader is also used of one who reads MSS. on behalf of a publisher, reporting on their merits. Meredith, Lord Morley,

Edward Garnett, and other eminent men of letters have acted as publishers' readers, sometimes being of very great importance in encouraging promising writers in their early days.

Reading. The act of perusing and interpreting written characters; more generally, noting and understanding marks of all kinds made on surfaces to convey ideas; e.g. engineering drawings, mathematical arguments (which at times employ a highly complex notation), picture writing or hieroglyphics, shorthand, chemical structures, electrical circuits, musical scores can all be read. Most of us have only a limited ability to read, many being able to interpret only written words and figures of their own language.

Steps towards learning to read are generally taken before the infant school stage. Much thought has been given by educationists to this process. At first the work of teaching to read was based on the alphabet and the building up of words from single letters and their sounds and the simplest syllables. But any phonetic plan must soon be abandoned in a language such as English; and the tendency has been to rely more and more on the "look and say" method. The child is taught to associate a whole printed word or phrase or even a whole sentence with a picture. Only when some progress has been made towards reading consecutive sentences and even simple stories is much attention directed to the analysis of individual words. In the attempt to expedite the reading of foreign languages, shorthand, etc., counts have been made to ascertain the most frequently recurring words, and textbooks based on these words have been prepared. Reading need not be accompanied by knowledge of what is read, and there seems to be no constant relationship between speed of reading and comprehension of the subject. *See* Alphabet; Phonetics; Writing; *consult* Psychology and Pedagogy of Reading, E. R. Huey, 1908; Books: An Introduction to Reading, W. W. Miller, 1932.

Reading. In British parliamentary procedure, term denoting successive stages in the passage or rejection of a bill. The first reading is a formal business without debate, but provides the opposition with the opportunity of rejecting the bill by moving that it be read a second time this day six months. The second reading with debate on broad lines is taken after the bill

has been printed and circulated to members. After the committee and report stages, the bill as amended comes up for the third and final reading, which is only formal. Divisions may be taken at all stages. *See* Parliament.

Reading. Co. bor. and the county town of Berkshire, England. It stands on the Thames, at the junction of that river with the Kennet, 36 m. W. by S. of London, and is served by rlys., being a junction, and by the Kennet and Avon Canal. Of the churches, the chief are those



Reading arms

of S. Lawrence, S. Mary, S. Giles, and the restored chapel of the Grey Friars, at one time used as the town hall. Other buildings include the municipal offices, connected with which is a museum famous for its collection of relics from Silchester (*q.v.*), and the county hospital. A university college opened here in 1892 was raised in 1926 to the status of a university; in addition to the main buildings it possesses two halls. There is a grammar school dating from 1486. In the prison Oscar Wilde wrote De Profundis and The Ballad of Reading Gaol. Some ruins remain of a Benedictine abbey founded by Henry I in 1121 and his place of burial; the grounds are public property. Palmer Park and Prospect Park are other recreation grounds. On the other side of the Thames is Caversham, while Earley and Tilehurst are other suburbs.

Reading is an important agricultural centre, being especially noted for its seeds. It has printing and engineering works and biscuit factories. The council maintains a service of buses and trolley buses. Reading became a corporate town in the 13th century, and was later a centre of the wool trade. Henry VIII made the abbey into a palace. From 1295 to 1885, and from 1950, Reading sent two members to the house of commons; between 1885 and 1950 it had one. Archbishop Laud was born here. Market days, Mon. and Sat. Population estimated 112,830.

Reading. Fifth city of Pennsylvania, U.S.A., the co. seat of Berks co. It stands on the Schuylkill river, 59 m. N.W. of Philadelphia, and is served by rlys. and the Schuylkill Canal. Reading lies in an important coal and iron mining region, and trades in agricultural produce. It contains rly. workshops, iron and steel works, ma-

chine shops, woollen and worsted mills, and hosiery, hardware, and boot and shoe factories. It is the leading centre for the production of fully fashioned hosiery. Founded 1748, Reading was incorporated 1783, and became a city 1847. Population 110,568.

Reading, RUFUS DANIEL ISAACS, 1ST MARQUESS OF (1860-1935). British lawyer and administrator. This son of a London fruit importer of Jewish stock was born Oct. 10, 1860, and called to the bar in 1887. Made Q.C. in 1898, he entered parliament as Liberal M.P. for Reading in 1904, and in 1910 was appointed solicitor-general and after a few months attorney-general. Asquith made him a member of the cabinet in 1912, the first attorney-general

so honoured. An advocate of immense reputation for clarity and skill in cross-examination, he was made lord chief justice and Baron



1st Marquess of Reading,
British lawyer
Russell

Reading in 1913. He assisted Lloyd George at the beginning of the First Great War in framing the financial measures which preserved British credit and secured the flotation of a large war loan. Success in negotiating an American loan led to his being appointed high commissioner and special ambassador to Washington in 1918. He was made viscount in 1916 and earl in 1918. Sent to India in 1921 as viceroy, he played a distinguished part: he established self-government everywhere except in Bengal and the Central Provinces, did much to still the anti-British feeling provoked by the Amritsar episode, tried to secure fair treatment for Indian immigrants to the Empire; but he had to arrest Gandhi for inciting to civil disobedience. When Reading retired in 1926 he was raised to a marquessate. He held

the foreign secretaryship for a few months in 1931, and died Dec. 30, 1935, when his son Gerald (b. Jan. 10, 1889) succeeded to the peerage. The latter's heir is Viscount Erleigh. The 2nd marquess wrote his father's life in 2 vols., 1943 and 1945. See India.

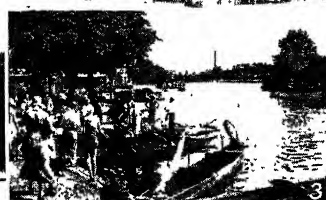
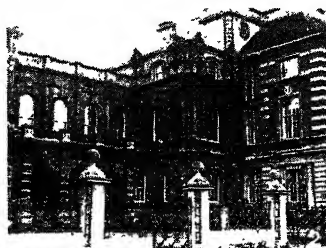
Reading, STELLA, DOWAGER MARCHIONESS OF. British organizer. Daughter of Charles



Dowager Marchioness of Reading,
British organizer

Charnaud, she was on the staff of the 1st marquess of Reading during his vicereignty in India, 1921-26; she married him as his second wife in 1931. She was founder and chairman of the W.V.S. from 1938. A governor of the B.B.C. in 1946, she became vice-chairman the following year.

Reading Beds. In geology, a group of sandy clays, clays, sands, and, locally, gravels of fluvial origin occurring below the London clay. When followed E. they show estuarine characteristics and are referred to as the Woolwich Beds. W. of London the Reading



Reading, Berkshire. 1. The Town Hall. 2. The Assize Court. 3. Scene on the river Thames where bathing and boating are enjoyed. 4. The College Hall and Cloisters of the University

Beds rest directly on the chalk, and E. they overlie the Thanet Sands. The clays are used for brick and tile making.

Reagent. A substance which acts in a chemical transformation. It is more particularly used of substances found valuable in qualitative analysis, and used as specific tests, e.g. sulphuretted hydrogen, which produces precipitates of various colours, the colour enabling the presence of certain metals to be confirmed.

Real (Sp., royal). Obsolete Spanish and Portuguese coin still current in Brazil. In Spain up to 1868 the real was the tenth part of an escudo (*q.v.*) and of nominal value 2½d. In Portugal, from 1854 till 1911, the gold milreis or 1,000 reis was the standard. Fifty and 100 reis nickel coins were also minted, and 20, 10, and 5 reis



Real. Obverse and reverse of the old Spanish coin. Actual size, $\frac{3}{16}$ in.

bronze coins. The Mexican real or Mexican shilling, once circulating in the U.S.A., had a nominal value of 12½ cents.

Realgar or **RUBY SULPHUR**. Red sulphide of arsenic, AsS. The realgar used in commerce is artificially prepared by subliming a mixture of arsenic and sulphur ores. Its chief use is in the tanning industry, where, mixed with lime, it removes hair from the skins. It is used for making Indian or Bengal fire in signal lights. Artists used native realgar as a pigment before it was superseded by lead chromate. It comes from Saxony and Switzerland.

Realism (L. Lat. *realis*, from *res*, thing). Philosophical term with two distinct meanings. As opposed to nominalism, it is the theory, held by certain of the schoolmen, that general ideas, the universals, had an existence independent of individuals and the individual mind. As opposed to idealism, it is the theory that external objects have an existence independent of any thought about them, and that our knowledge of them is immediate or intuitive. See Idealism; Nominalism.

Realism. In art and literature, the direct representation of any subject as it is, a treatment, literally, that excludes idealism or romanticism. But the true work of art, however realistic its treatment, must perforce contain some elements of idealism, or fail in its purpose. Realism made its entry into French painting with Courbet. In sculpture it expressed itself in widely different manners, through Carpeaux, Barye, and Rodin.

In literature, the term is particularly applied to the method of the school of writers of fiction who describe life with strict fidelity to actual fact, as opposed to the schools of romanticism or classicism. The realist tendency, often also called naturalism, is found scattered in all modern literatures, and at various periods, but became crystallised into a definite school, mainly under French influence, in the second part of the 19th century. The painstaking dissection of character is seen earlier in Stendhal or Balzac, but Flaubert moved forward and achieved a masterpiece in Madame Bovary. He was followed by the de Goncourts, Huysmans, de Maupassant, Zola, and many lesser figures. Heated controversy arose round the alleged tendency of the realists to emphasise the sordid and corrupt in life; but their influence on the

novel was far-reaching, although their lengthy and laborious elaboration of detail gradually gave place to a more eclectic form.

In English literature realism has been tempered by characteristic moderation. George Eliot, Meredith, George Moore, Hardy, Wells, Bennett, Galsworthy, Eden Phillpotts, H. E. Bates, and (in the U.S.A.) Sinclair Lewis and John Steinbeck, represent phases of its growth, and the influence is seen in the later stress on detailed psychological analysis in the novel, as in Joyce. Gorky, Chekhov, Strindberg, Sudermann, Couperus, Knud Hamsun, Pierre Hamp, are typical of their respective countries, and the corresponding tendencies in drama are seen in Ibsen, Hauptmann, Eugene O'Neill, and again Galsworthy. See Naturalism; Romanticism.

Reality (L. Lat. *realitas*, from *res*, thing). In philosophy, the state or quality of being real, the "thingishness" of anything. That is real which is true and existent, such existence being absolute and necessary, either external and altogether independent of thought, or internal and dependent upon thought, but not upon the exercise of thought about it. Reality means something, possesses significance, but is not the subject of thought. The term is sometimes opposed to actuality, which rather indicates the nature and degree of reality attaching to real objects. Various kinds of reality have been distinguished: empirical, belonging to all objects of experience; objective, given to things as objects of sense-perception; subjective, in reference to a fact which is the subject of consciousness. See Metaphysics; Philosophy.

Realpolitik (Ger., policy of reality). Term used during the last thirty years of the German empire to denote the political attitude inaugurated by Bismarck and pushed to extreme lengths by his successors. The adherents of *Realpolitik* maintained that the politician should look primarily to the material interests of his nation, disregarding abstract theories and humanitarian ideals. See Bismarck; Germany; Politics.

Real Presence. Term used in theology to denote the doctrine that the living Christ is actually present in the experience of the Church and the individual believer, especially in the Sacrament of the Eucharist. The term "real" distinguishes this belief from the theory that Christ is only "sym-

bolically" present in the sacrament. Different views are held as to what constitutes the Real Presence and how it is produced. One holds that it is corporeal and produced by transubstantiation (*q.v.*). Another that it is purely spiritual—an experience within the soul of the participant. Though in modern usage the term has almost always a sacramental connexion, in the N.T. it has a much wider significance. Both S. Paul and S. John lay the utmost stress upon the mystical union between the believer and the risen Lord. To be "in Christ" and for Christ to be "in us" is the prerogative of every Christian. Perhaps the fullest enunciation of the doctrine is found in the words of S. Paul, "I live, yet not I, but Christ liveth in me." See Eucharist; Incarnation.

Real Property. One of the two sections into which property is divided under English law. In early times actions at law were of two kinds, real and personal. A real action was where the plaintiff asked the court to award him the thing (Lat. *res*) sued for. A personal action, *e.g.* for debt, detinue, and trespass, was where the plaintiff simply asked for a sum of money, a debt or damages. The only *res* worth suing for in those days was some freehold, either land, or some freehold estate, in or arising out of land; and if a plaintiff were dispossessed of any of these, the court would reinstate him in them. There were no long leases in those days. Land was generally held for a freehold estate. Its few leasehold tenancies were usually mere yearly holdings; and therefore no real action would lie in respect of them. They were called chattel interests in land. In this way property in England came to be divided into real and personal; real being those kinds of property in respect of which a real action could be brought; while everything else was personal.

It thus came about that real property included land held for a freehold or copyhold estate. Certain rights arising out of land were also real—rights of fishery, rights of way, profits à prendre. The title deeds of real property were themselves real. So were advowsons, tithes, dignities, certain offices, *e.g.* the office of hereditary earl marshal of England. But a lease for years was not real, but personal property. The Law of Property Act, 1925, made extensive reforms. See Land Laws.

Ream. Measure of paper. It consists of 480 sheets, or 20 quires. The perfect, long, or printer's ream contains 516 sheets, the surplus to make up for waste; a news ream, for printing newspapers, is 500 sheets. The word is derived from the Arabic word *rizmah*, a bundle.

Reamer. Tool for making or enlarging holes. See Drill.

Reaping. Term loosely used for the harvesting of any grain crop. Originally, to reap meant to cut down crop with a sickle—a steel blade roughly semicircular. The sickle has been superseded by the scythe, and neither tool is used to any extent except on small or awkward areas where binders or combine harvesters cannot travel. Antiquarians give evidence of bronze reaping hooks in France c. 2000 B.C. A successful reaping machine did not work in Great Britain until in 1826 one was produced by the Rev. Patrick Bell which may be seen in the Science Museum, London. Although this was a forerunner of all reapers it did not attract much notice until the Great Exhibition of 1851 drew attention to similar machines from America.

The cutting mechanism of the reaper differs little from that of the mower. A knife, composed of triangular sections giving a serrated edge not unlike a saw, reciprocates between steel fingers and thus produces a scissor action as it is drawn through the crop. The drive for the reciprocating fingers is taken from the large ("bull") land wheel, which carries most of the machine. From the same source four sails are driven to revolve in such a manner that they sweep the cut grain in more or less even quantities from a platform behind the cutter bar on to the ground.

Thus bundles are delivered for binding by hand into sheaves. The sheaves are stooked, i.e. pairs of sheaves are inclined towards each other so that they stand with only the cut ends on the ground, three or four pairs of sheaves constituting a stook. Most crops remain outdoors in stook for two or three weeks to mature before being carted to the stack where the small amount of sap left in them dries out. They are then fit to thresh.

Since 1900 the machine in greatest use has been the binder. Based on the original reaper, this is the outcome of Appleby's patent knoter (1869) whereby the sheaves are automatically tied with twine. To the cutting mechanism, driven

by the bull wheel, has been added a reel to gather the crop on the knife; the elevating system of endless canvases; and the binding and knotting mechanism. The binder for tractor draught is driven from the power take-off of the tractor instead of from the big wheel as in horse-drawn machines. The tractor travels at 4 to 5 m.p.h., compared with the horse's 2 to 2½ m.p.h.

To reduce the labour involved in binding, stooking, carting, stacking, thatching, and finally threshing, a cereal crop combine harvester has been developed. As the crop is cut it is elevated into a threshing drum, where the grain is extracted, the straw ejected. Grain may be passed into sacks or into a tank whence it is transferred into vehicles. More often than not such grain has to be dried artificially by hot air. A combine harvester is usually tractor-drawn, but some with their own engines of about 30 h.p. are self-propelled. Cost ranges from £300 to about £1,000. Seasonal output is based on 30 acres per ft. of cutting width. A 12 ft. combine harvester should harvest on the average 360 acres of grain during the season of 8 to 10 weeks. From under 500 in 1939 the number of combine harvesters in Great Britain rose to over 5,000 in 1948. An illus. showing a combine harvester is in page 179.

Rear-Admiral. Officer of the British navy, the lowest of flag rank. He is distinguished by the



Rear-Admiral's cap badge

broad gold band with one narrow gold band, and curl above it upon the cuff. Rear-admirals are the next in rank above commodores, 1st and 2nd class, and equivalent to major-generals in the army and to air vice-marshals in the R.A.F. See Admiral illus.

Rear-Gunner. Machine-gunner on a bombing aircraft who is responsible for defending it from rear attack. He is accommodated in a power-operated revolving turret fitted to the tail of the aircraft and armed with two to four machine-guns firing as a single weapon. In service slang he is "Tail-end Charlie."

Reason (Fr. *raison*; Lat. *ratio*). Mental faculty and process of drawing conclusions from premises. It embraces the collective ideas and

judgements which are common to all men and are distinguished by certain characteristics from the ideas and judgements which are the result of experience. The principles of reason are necessary, since they are the conditions of thought, and it is impossible to imagine their contrary; and universal, since they are applicable to all real or possible cases under the same conditions. The generally accepted principles are identity (*q.v.*), A is A; sufficient reason; contradiction, A is not not-A, a thing cannot be other than what it is; the excluded middle, A is either B or not-B, a thing must be either one thing or another; substance, the permanent element underlying the manifold and shifting phenomena; causality, everything has a cause.

Reason, as contrasted with instinct, denotes the mental faculties which distinguish men from other animals; it is also used as the opposite of insanity. The word is also applied to the faculty which enables us to apprehend intuitively, without analysis, certain truths, which are related to particular judgements as a reason to the consequence. Kant defines intuitive reason as the faculty which supplies the principles of knowledge *a priori*; pure reason is the faculty which supplies to principles of knowing anything entirely *a priori*; practical reason is the source of *a priori* moral principles. Understanding, as opposed to reason, is discursive. See Cause; Logic; Metaphysics; Rationalism.

Réaumur, RENÉ ANTOINE FERCHAULT DE (1683-1757). French physicist and naturalist. Born at

La Rochelle, Feb. 28, 1683, he went to Paris in 1703 to study mathematics and physics, and became a member of the Academy of Sciences, 1708. He made a



R. A. F. Réaumur, French physicist

study of the properties of iron and steel; invented a method of tinning iron that is still employed; experimented in artificial incubation; and wrote much on marine animals, insects, etc. He gave his name to the Réaumur scale (*v.i.*). His researches on spider webs led him to suggest the possibility of making synthetic silk from wood fibre. He died Oct. 17, 1757.

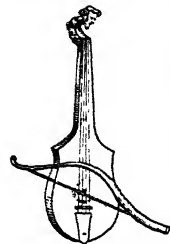
Réaumur Scale. The thermometric scale worked out by the above scientist in 1722. It was

based on the principle of taking the freezing point of water as 0° and graduating the tube into degrees, each of which was 1/1000th of the volume contained by the bulb and tube up to the zero mark. The boiling point of water, fixed at 80° , was arrived at by the coefficient of expansion of the particular alcohol used when Réaumur established his scale. The scale is now seldom used, the so-called Réaumur mercurial thermometer, with stem graduated into 80 equal parts between the freezing and boiling points of water, being a Réaumur only in name. *See* Thermometer.

Rebate OR **RABBIT** (O.F. *rabat*, recess). Step-shaped recess formed along the face of a wooden or stone member. Window frames are rebated to form a recess in which the glass pane lies. Rebates are used in joinery for receiving panels, which are secured in the recess by a bead or slip nailed in front. A rebate plane will finish the job in woodwork after the recess has been cut with another type of plane. Its blade is as wide as the body of the plane and protrudes through it from side to side, so allowing the tool to cut to its full width. *See* Plane.

Rebate. In commerce, an allowance or discount deducted in cases of prompt payment, or of proved inferior quality or short delivery of goods ordered. The term is also used for the deduction made from excise duties, rates, etc., under certain conditions. *See* Discount.

Rebec OR **REBECK**. Stringed instrument of Oriental origin, played with a bow.



Rebec, with bow

First mentioned in the 8th century, it seems to have gone out of fashion in the mid-17th century. Its shape was that of a pear cut in halves longitudinally. In the Middle Ages there were different sizes, forming a set corresponding to the various voices. A modification in the 12th century was called the rubbe or rybye, which eventually became the parent of the viol and the fiddle. There is a stone carving of the rebec in the crypt of Canterbury cathedral.

Rebecca. Character in Scott's novel *Ivanhoe*. She is the beautiful daughter of the wealthy Jew, Isaac of York. She defies the

advances of Bois-Guilbert, is accused of sorcery, and successfully championed by Ivanhoe. The character was suggested in part by a Philadelphia Jewess, Rebecca Gratz, whose story was told to Scott by Washington Irving in 1817, and retold by Gratz van Rensselaer in the *Century* magazine, 1882.

Rebecca Riots. Name given to riots that took place in South Wales in 1839 and more seriously in 1843. There were various reasons, economic and social, for the unrest, but the immediate one was the heavy charges at toll-gates. The rioters took hold of a passage in Gen. 24, in which it is said of Rebekah, "let thy seed possess the gate of those which hate them." They went about, often on horseback, often disguised as women, and destroyed many toll-gates and houses. Emboldened by success, they grew more formidable, and soldiers were sent to deal with them. They were then soon suppressed and their main grievance remedied.

Rebekah. In the O.T., sister of Laban and wife of Isaac. The mother of Jacob and Esau, she invented the plan by which her favourite son Jacob deprived Esau of his father's blessing. She was buried in Abraham's tomb in the field of Machpelah (Gen. 24-27, 49). As a popular first name among the Jews the name is commonly spelt Rebecca.

Rebus (Lat., by things). Allusive representation of a name or thing by means of pictorial devices; in other words, a pictorial pun. In heraldry, such devices were common during the Middle Ages. Similar devices were used by some early printers and others not possessing armorial bearings. Picture puzzles in the form of rebuses are popular competitions. *See* Allusive Arms.

Recalescence. Term given by metallurgists to a property of iron. If an iron wire is made red-hot in a flame, then removed, and allowed to cool, its bright colour will steadily disappear until the wire is quite dark, then, in a moment, after the wire has cooled a little more, it will suddenly glow again. This reappearing colour is the phenomenon of recalescence. It is supposed to be due to the fact that, when the cooling iron has reached a certain temperature, there takes place a change in the arrangement of the molecules of the metal, in which heat is liberated, though the temperature of the wire does not reach that of the first red-hot condition. *See* Steel.

Récamier, JEANNE FRANÇOISE JULIE ADÉLAÏDE BERNARD (1777-1849). French society leader. Born



Madame Récamier. From the painting by David, in the Louvre, Paris

at Lyons, Dec. 4, 1777, she came to Paris, 1784, married Jacques Récamier, a wealthy banker, 1793, and about 1798 became an intimate friend of Madame de Staël (*q.v.*). After her husband's bankruptcy, 1806, she lived with Mme. de Staël at Coppet, Switzerland, where she met Prince Augustus of Prussia, to whom she was for a time affianced. In 1811 she was forbidden by Napoleon, who feared her enmity, to live in or near Paris. She returned in 1815, was the intimate friend of Benjamin Constant, and her later years were passed with Châteaubriand until his death, 1848. Her salon at L'Abbaye-aux-Bois was a famous social centre. She died in Paris, May 11, 1849. *Consult* Madame R. et Ses Amis, E. Herriot, new ed. 1934.

Recanati. City of Italy, in the prov. of Macerata. It stands between the rivers Musone and Potenza, 6 m. from the Adriatic and 4½ m. from its station, Porto Recanati, on the coast rly. On a hill, at an alt. of 931 ft., it has remains of a 15th century wall and gate, and a 14th century Gothic cathedral. Founded in the 10th century, and important in the Middle Ages, it was damaged by earthquake in 1741, and was sacked by the French in 1799. The poet Leopardi was born here. Pop. 16,600.

Recapitulation. Biological doctrine of development. According to this doctrine organisms, in order to survive and succeed in the same environments as those of their parents, must closely resemble those parents, and this close resemblance can be obtained only by the development of the offspring along similar lines. The child treads in the footsteps of its parent, and the steps from embryonic life to adult development must be very similar to those previously taken by the parent. In other words, the child recapitulates the parental development. If it does not do so, the result is an individual unlike

the parent, and therefore unsuited to its environment, and as such it will inevitably perish.

Recca or **REKA**. River of the Carso in Trieste and Yugoslavia. It is noted for its waterfalls and caves. Its subterranean course runs from Canziano for 20 m., when the stream re-issues at San Giovanni with a width of 200 ft. and a depth of 6 ft. as the Timavo, and flows $1\frac{1}{2}$ m. to the Gulf of Trieste.

Receipt. Acknowledgment of payment. It is not necessary in English law. A debtor cannot refuse to pay what he owes because the creditor will not give him a receipt. A creditor who refuses to give a receipt in cases where the receipt should be stamped is, however, liable to a penalty of £10. A receipt is *prima facie* evidence of payment; but the person who gave it is always at liberty to show, if he can, that although he gave a receipt he did not receive payment; or that there is a mistake. The receipt is not conclusive against him, although the court would require very strong evidence to decide against an unconditionally worded receipt. With a few exceptions, a receipt for money of £2 or over must bear a twopenny stamp.

Receiver. In English law: (1) A person appointed by the court to hold property of any kind, and preserve it for the benefit of those persons who are ultimately held to be entitled to it. As soon as a receiver is appointed, he has possession of the property, and it is a contempt of court to interfere with his possession. Receivers are appointed in partnership actions, to preserve and realize the partnership property, collect the debts, etc., also in actions by debenture holders to realize their security, and in a large variety of other cases where it is beneficial to the parties to take the custody and control of assets out of the hands of the holder, and place it in the hands of an impartial and responsible person. Generally, a receiver is required to give security, to ensure that he will faithfully carry out his duties. (2) A person appointed by a mortgagee or debenture holder under a power in the deed to receive the rents and profits of the mortgaged property, and after paying expenses, to pay what is due to the mortgagee. (See Official Receiver.)

To receive property knowing it to have been stolen (including property acquired by false pretences, or extorted by threats) is a high

criminal offence. By English law the maximum punishment is imprisonment for 14 years. The English law allows evidence to be given, on a trial for receiving, that the prisoner is in possession of other property stolen within the previous twelve months; and it also permits the prosecution to prove that within the previous 5 years the prisoner has been convicted of a crime involving fraud or dishonesty. This forms a striking exception to the English rule that a prisoner on his trial shall not be prejudiced by the jury being informed of other crimes he has committed. The reason for the exception is that persons accused of receiving generally set up the defence that they had no reason to suspect that the goods were stolen.

Receivers of wreck are appointed by the Board of Trade from among the officers of customs, coast-guard, or inland revenue. When a vessel is wrecked or in distress the receiver must take charge of the persons present and give directions for the preservation of the vessel and cargo and the lives of those on board. Any person finding any wreck or cargo from a wreck must notify the receiver.

Receiving Order. Legal proceeding necessary for a bankruptcy. When in Great Britain, a person presents his own petition in bankruptcy, or a successful petition is presented against him by a creditor, the first step to be taken is to protect his assets. Accordingly a receiving order is made, the effect of which is to vest the whole of the bankrupt's property in the Official Receiver until such time as the creditors and the court shall decide what is to be done. After this receiving order is made, the bankrupt can no longer deal with his property, nor can anyone else. For example, a judgement creditor cannot proceed with an execution. The order does not extend to the debtor's personal earnings; but it includes all other property, whether in possession or reversion. See Bankruptcy.

Receptacle. In botany, the axis of the flower, to which the sepals, petals, stamens, and carpels are attached. See Flower.

Recessional (Lat. *recedere*, to withdraw). Hymn sung while clergy and choir withdraw after

church service. The title was used for the well-known poem by Rudyard Kipling with the refrain "Lest we forget," published in *The Times* immediately after Queen Victoria's diamond jubilee in 1897, and included six years later in the collection of his poems entitled *The Five Nations*.

Rechabites. Religious order of the Hebrews. Founded by Jehonadab, son of Rechab (2 Kings 10, vv. 15-28), who assisted Jehu to destroy the worshippers of Baal, the sect or clan calling themselves "sons of Rechab" maintained the religion of Jehovah in purity, abstaining from wine, settling nowhere, having no possessions, but living in the land as "strangers" (Jer. 35, vv. 6-7). At the approach of Nebuchadrezzar they took refuge in Jerusalem, and were held up to the Jews by Jeremiah as models of devotion and piety. The term was revived in the 19th century by a society of total abstainers known as the Independent Order of Rechabites.

Recherché Isles. One of the archipelagoes off the S. coast of W. Australia. The islands, with rocks and reefs, from E. to W. for nearly 200 m. were explored by a scientific expedition in 1921.

Recidivist (Lat. *recidivus*, falling back). In criminology (*q.v.*), a name given to an old offender, i.e. one who has been sentenced more than once for criminal offences. The recidivists comprise on an average half the prison population of the world, and in some countries the percentage is as high as 70. Efforts are being made in many countries to face the problem by methods of preventive detention and extended police supervision. The mentally defective form a large percentage of recidivists, and the problem of the reform of the recidivist is most difficult.

Recife. Oldest and chief commercial part of the city of Pernambuco (*q.v.*) in Brazil.

Reciprocal (Lat. *reciprocus*, alternating). In mathematics, the reciprocal of a function or quantity is such that when multiplied by the function or quantity the product is unity. Thus $\frac{1}{2}$ and 2 are reciprocal numbers, $a+b$ and $1/(a+b)$ are reciprocal quantities, etc. Reciprocal equations have their roots of the form a and $1/a$. A series of quantities form an harmonic progression when their reciprocals form an arithmetical progression.

Reciprocating Motion. Motion to-and-fro in a straight line, e.g. that of the piston and piston-rod of a steam engine. A crank is re-



Receptacle of the wild rose, shown at R

quired on the driver or driving shaft to convert reciprocating into rotary motion. Parts of machinery which move in this way are known as reciprocating parts.

Reciprocity. The condition of giving and receiving mutually. In politics the word is applied particularly to trade agreements in which one government confers rights on the other specifically in exchange for rights given to it; e.g. country A may undertake to admit certain classes of goods from country B at a lower rate of import duty in exchange for a comparable concession from country B. Such reciprocal undertakings are a normal feature of so-called bilateral trade agreements. See Free Trade; Imperial Preference; Most Favoured Nation Clause; Protection; Tariff Reform.

Recitative. Species of declamatory music in which the natural accentuation of the words combined with dramatic emphasis is the first consideration. It is entirely free as regards structure, and is thus sharply differentiated from the formal airs or choruses between which it occurs. It is of two kinds: *Recitativo secco*, in which the accompaniment is as light as possible, consisting of only a few chords, played originally from a figured bass; and *R. stromentato*, in which the accompaniment forms an essential part of the effect. For an example of each see Nos. 15 and 16 in Handel's Messiah. The dramatic scene is a development of accompanied recitative, while a great deal of Wagner's music is directly descended from it.

Recklinghausen. Industrial town in the Ruhr, Germany. It is 15 m. N.W. of Dortmund. Supposedly founded by Charlemagne, it became a town in 1236, a member of the Hansa in the 14th century, and from the 12th to the 16th century was owned by the archbishop-electors of Cologne. In 1803 it came to the duchy of Arenberg, in 1810 to the grand duchy of Berg, in 1815 to Prussia. There are a castle (1700), S. Peter's church (1276), and other public buildings (heavily damaged during the Second Great War). This is a rly. junction and a canal port, and its industries comprised coal-mining, iron works, engineering, chemical, and textile plants, and breweries. Captured by the U.S. 9th army, April 3, 1945, Recklinghausen lay in the British zone of occupation after the German surrender in May. Pop. (1950) 92,000.

Reclamation (Lat. *reclamare*, to dry out again). Act of winning

back or recovering. The word is chiefly used in connexion with the recovery of land from the sea. This requires engineering works for excluding the sea from foreshores in river estuaries covered at high tide, and the draining of low-lying tracts which are waterlogged by the overflow of streams passing through them, or by the lack of natural drainage. In some districts, where the general level is below that of the sea, exclusion of sea and river water and the expulsion of water already accumulated have to be effected under one scheme. This has been notably so in the Netherlands and the fens of E. Anglia.

To reclaim a foreshore, an enclosing embankment is formed rising above the level of the highest spring tides. In places where wave-action is strong, keeping the embankment in repair may entail a great deal of watchfulness, labour, and expense. Reclaimed ground is drained by ditches emptying into a main ditch running along the inside foot of the embankment. At intervals sluices from this ditch are cut through the dyke, with flaps at the outer end; so that water is discharged when it stands higher inside than outside, but cannot enter when the tides cover the sluices. If the fall is insufficient for gravity drainage, the water is lifted over the sea-wall by steam- or wind-driven pumps.

Fen land is protected by dykes from streams which flow through it. A system of drains and ditches leads the water to points where it is pumped or sluiced into rivers or artificial cuts. As the ground dries it consolidates and sinks, whereas the beds of streams tend to rise if much silt is present in the water they carry. Consequently the lift to be given by the pumps may increase considerably in time.

Reclamation of areas by covering them with mud, sand, or silt confined by an embankment or wall is practised only if the new ground will have high value and the material for filling is obtainable at small cost. The planting of long-rooted grasses helps to bind the soil and prevent erosion through seepage. The ideal conditions for this kind of work are found where material excavated by dredgers from a position in which it is obstructive can be turned to useful account to raise the level of land adjacent to the water where the dredger is operating. In Bombay harbour almost a square mile of ground was reclaimed by clay cut from the

bed of the harbour and delivered through long floating pipes. See Embankment; Fens; Netherlands; Pontine Marshes; Ysselmeer.

Recluse (Lat. *recludere*, to shut up). Man or woman living alone for the purpose of devotion to religion. In medieval days such persons were known as anchorites and anchoresses. They usually lived in a cell or small building attached to a church or convent. They were dedicated to the life by the bishop, and the entrance to the cell was usually closed. But the life of the inmate was not one of undue austerity, and popular ideas on the subject are greatly exaggerated. The recluse or anchorite was distinguished from the hermit by the fact that he remained within his cell, while the latter was under no such restriction. See Anchorite.

Recognizance. In English law, a written acknowledgment of a debt due to the crown, with a condition that the debt shall be void if such-and-such a thing is done, or not done. Thus a prosecutor is bound in the sum of £20, but the money is not to become payable if the prosecutor appears to prosecute the accused at the next sessions, etc. A surety for bail enters into a recognizance, promising to pay a certain sum; but if the prisoner shall appear to take his trial at the next sessions, etc., the recognizance is void. See Bail.

Recollet Fathers (ultimately from Lat. *recolligere*, to gather together). Name given to the Friars of the Strict Observance, a section of the Observantine branch of the Franciscan Order. An alternative spelling of the name is Recollect. They were founded about 1489 by Juan de Puebla in Sierra Morena, Spain, and did much missionary work in S. America. They also spread into Italy and France. These friars had charge of the sacred places of the Latin observance at Jerusalem. The name Recolletes has been adopted by a reformed branch of the Poor Clares. See Franciscans; Monasticism.

Reconnaissance. Military term for the employment of troops to obtain information in war as to the topographical features and resources of a country, or the movements and dispositions of an enemy. Strategic reconnaissance is required before the opposing armies are within striking distance of one another; the frontier raids which immediately follow a declaration of war are of this character. Tactical reconnaissance is the work of advanced guards and outposts when hostile forces are in contact and

battle plans are dependent on knowledge of the enemy's preliminary dispositions. Until the development of aeroplane and armoured car, reconnaissance was generally carried out by cavalry.

Reconnaissance by a large force of all arms, designed to provoke the enemy into revealing his dispositions by bringing him to action, is called reconnaissance in force (*see* Dieppe). In the static fighting of the First Great War, there was little opportunity or need of elaborate reconnaissance, but the mobile operations of the Second Great War rendered it essential.

In 1941 a reconnaissance corps was raised in Great Britain and trained on commando (*q.v.*) lines. One of its battalions was attached to each infantry division to provide a mechanised equivalent of the old divisional cavalry; each battalion had 850 men mounted on armoured cars, Bren carriers, and motor cycles. The corps had an anti-tank battery and mortar and machine-gun sections. Its function was to be in the van of an attack, reconnoitre the ground, delay and disorganize the enemy, and transmit information to divisional headquarters. Battalions served in Africa, Italy, and Burma. In Jan., 1944, the unit was absorbed by the Royal Armoured Corps (*q.v.*). *See* Patrol; Raid; Strategy; Tactics.

Reconstruction. Term used in commercial law. When a limited liability company has suffered heavy capital losses, and it is not desired that the concern shall cease business altogether, the company is often reconstructed. This may be done by winding up the company and transferring its business and assets to a new company, paying for the assets by shares in the new company which are only partly paid up. These shares are distributed among the old shareholders, each one becoming liable to pay certain further "calls" to provide more funds.

Thus, suppose the old company's capital was £10,000 in 10,000 £1 shares, all of which have been paid up, the new company will pay for the business and assets 10,000 £1 shares credited with 10s. paid up. The effect is that each shareholder will receive share for share, but he will have to meet a fresh liability of 10s. on each share. There are several other methods. *See* Company Law.

Reconstruction, MINISTRY OF. Dept. of the British govt. formed in 1917 to prepare for the end of the First Great War, its object being

to promote smooth demobilisation and conversion of industry from a war to a peace basis. It was later amalgamated with the ministry of National Service and wound up in 1920. During the Second Great War Lord Woolton was appointed minister of Reconstruction, Nov., 1943. The post was not continued when Winston Churchill formed his "caretaker" govt. in May, 1945. Woolton, however, as lord president of the council remaining responsible for reconstruction, duties connected with which were, under the Labour govt. formed in July, transferred to the ministries of Labour and National Service, Supply, Health, and Town and Country Planning.

Record. In English law, a collection of documents relating to an action. In the higher courts the writ of summons, the pleadings, and all material documents in the case down to the judgement are filed in court, and the whole of these together are called the record. Sometimes, when an action is compromised before trial, the parties ask the court to be allowed to withdraw the record, which is equivalent to asking that the case be withdrawn from the cognizance of the court. At one time all documents forming the record were engraved on parchment, and fastened together so as to form one long sheet. This sheet was then rolled up, and preserved in the custody of an official of the chancery, who was called the master of the rolls. Nowadays, such records are written on paper, and bound up, and are kept in the record office (*q.v.*), where they are accessible to the public.

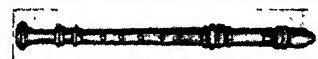
Courts of record are those courts the judicial acts and proceedings of which are preserved. Such courts are divided into two classes, superior and inferior. The former include the house of lords judicial committee, court of appeal, high court, etc. The superior courts have the power to fine or imprison any person for contempt of their authority, but inferior courts can imprison only for contempt committed in court.

Record. A name given to a cylinder or disk of hard wax or other material for the reproduction of the human voice, musical sounds, etc. The perforated roll used in piano players is also known as a record, as is the perforated ribbon used in an automatic telegraphic apparatus. In general the mechanical or automatic register of any phenomenon is known as a

record, *e.g.* a record of rainfall. (*See* Gramophone; Sound Reproduction.) The word is also used, especially in sport, to indicate the supreme performance of its kind, *e.g.* the record score in cricket or the record time for a race. This use has extended to other fields, *e.g.* the record rainfall is the greatest quantity for a particular period.

Recorder. In England, a legal official of a city or borough. The appointment and duties of a recorder are regulated by the Municipal Corporations Act, 1882. Under this statute, when a borough or city has a separate court of quarter sessions the crown may appoint a barrister of 5 years' standing to be recorder. He holds office during good behaviour, and is a J.P. for the borough. He has precedence next after the mayor; but cannot be M.P. for the borough nor sit on the town council. Salaries are payable by the borough. *See* Quarter Sessions.

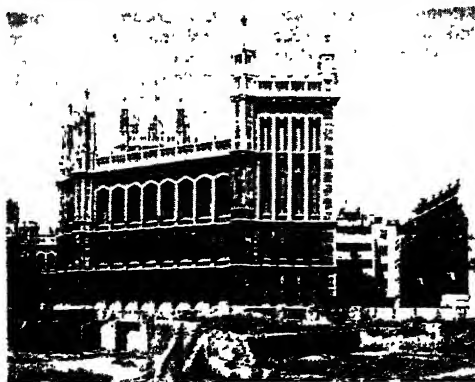
Recorder. Musical instrument of the fipple flute family, having a very attractive tone akin



Recorder. Wood-wind instrument akin to the flute

to the song of birds. It was a favourite instrument in Tudor times, and is referred to in Elizabethan literature, *e.g.* in Hamlet, act 3, scene 2. Like other medieval instruments, recorders were made in sets or "chests." At Chester there is an 18th century set of four, and at Nuremberg a 16th century set of eight. The instrument had eight finger-holes, and had a compass of about two octaves. It became known as the *flûte-à-bec* or English flute, and was eventually ousted by the stronger-toned transverse or German flute. Between the Great Wars there was in the U.K. some revival of the recorder, especially in schools.

Record Office, PUBLIC. British national institution. It is situated N. of Fleet Street, between Chancery Lane and Fetter Lane, London, E.C.4, on what was known as the Rolls Estate, and is the repository of records of the courts of law and government departments from 1100 to the present time. The buildings, in Tudor Gothic style, with tall, deeply embrasured windows, were designed, 1851-66, by Sir James Pennethorne and, 1891-1900, by Sir John Taylor, those at the Chancery Lane end, built in the



Record Office, London. Rear view of this fine building, seen across the air-raid devastation of the Fetter Lane area

latter period, and covering the site of the Rolls Chapel and the old court of the master of the rolls.

The muniment rooms are arranged along narrow concrete or brick-paved passages, the entrances to which are guarded by iron doors, and the presses in which the documents are preserved are of slate. The keeper of the records is the master of the rolls, and the staff includes a deputy keeper, secretary, and a number of assistant keepers. Facilities are offered for private research work, e.g. Dr. Wallace's Shakespearian discoveries were made by him when examining documents belonging to the court of requests, and students' tickets permit inspection of all legal documents down to the beginning of the 19th century, and the older records of most of the government departments. Legal records later in date than 1800, and census returns, may be seen on payment of fees, and the more recent departmental records can be inspected only by permission of the department concerned.

In England, public records were first ordered to be kept by Henry I early in the 12th century. Before the existing Record Office was built they were deposited in the Rolls Chapel, the Tower of London, the chapter house of Westminster Abbey, the state paper office in St. James's Park, and elsewhere. Among the treasures in the Record Office museum are William the Conqueror's Domesday Book, the Domesday chest, the earliest known printing of Caxton, the anonymous letter to Lord Monteagle which led to the discovery of the Gunpowder Plot, the black book of the exchequer, plan of the Kirk o' Field, log of

historic courts, and MSS. concerning the suppression of the monasteries. Many volumes have been issued under the aegis of the office, calendars of state papers, for example, as well as several unofficial works based upon private research among its archives; but masses of documents still await expert examination. During the First Great War many of the treasures were removed for safety to Bodmin; in 1939-46 they were at Shepton Mallet. See Sources and Literature of English History to about 1485, C. Gross, 2nd ed. 1915; Guide to the MSS. in the Public Record Office, M. S. Giuseppe, 1923-24.

Recruiting. Voluntary enlistment of men into a navy, army, or air force, as distinct from compulsory enrolment or conscription. Men so enlisted, termed recruits, bind themselves to agreed conditions of service for a definite period. In Great Britain an enlisted man officially ceases to be a recruit when he passes his course in musketry; thereafter he ranks as a soldier. Recruit training in the General Service Corps lasts six weeks, after which the recruit is drafted into a regiment or unit. The recruit takes the oath of allegiance, whereas the conscript does not. Administration of recruiting is under the dept. of the adjutant-general at the War office. In most countries, recruiting and conscription exist together. See Conscription; Derby Scheme; Enlistment; Militia; Press Gang.

Rectangle. (Lat. *rectus*, right). Plane, rectilinear, four-sided figure of which all the angles are right angles. The opposite sides are equal and parallel, and the area equals the product of two adjacent sides. See Geometry.

the Victory during the battle of Trafalgar, dispatch of Wellington relating to the battle of Waterloo, and the bull of Clement VII confirming Henry VIII in the title of defender of the faith, and the "scrap of paper" treaty of 1839. There are a long series of royal charters, patent rolls, records of the star chamber and other

Rectification. Term used in English equity, or chancery law. If a mistake has been made in a deed or document, either party can bring an action to have it set right; and the court, on proof of the error, will order that the deed or document shall be rectified. Although any branch of the high court has power to order rectification of a document, all actions for rectification ought to be brought in the chancery division, to which they are assigned by the rule of court.

Rectification. In mathematics, term used for the calculation of the lengths of curved lines. Such lengths are obtained theoretically by means of the integral calculus. In practice the lengths of curves are often obtained by means of an opisometer. A wheel is run along the line, and by noting the number of revolutions the required length is deduced. In chemistry rectification is a process of purification of liquids by means of fractional distillation.

Rectified Spirits, or SPIRITS OF WINE. Solution of ethyl alcohol in water containing 90 p.c. volume-in-volume. It is made by diluting 95 p.c. ethyl alcohol with water and is described in the British Pharmacopoeia. See Alcohol.

Rectifier. Electrical device for converting A.C. into D.C. Many types are in use. Mechanical rectifiers reverse the electrical connexions twice per cycle by a commutator driven from a synchronous motor in step with the A.C. supply, or by moving contacts mounted on a magnetised metal reed, made to vibrate in synchronism. A variation of the commutator type rectifier, with a number of revolving arms, is used in X-ray and other high-voltage work. Electronic rectifiers depend on the "valve" action of a stream of electrons, either in a vacuum or in an ionised gas such as mercury vapour, which gives unidirectional conductivity. The two-electrode radio valve is an example of the first, and the mercury arc rectifier of the second type. This latter is made in sizes ranging from a small glass bulb to a steel tank model, rated in thousands of kilowatts. The most common type for general purposes is the metal rectifier, which uses the unidirectional conducting properties of a film of copper oxide or selenium; it has a high efficiency, and is in demand for charging batteries. See Grid Rectifier.

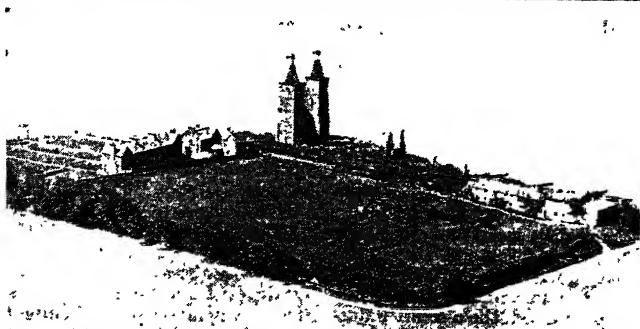
Rector (Lat., ruler). In ecclesiastical law, an incumbent of a benefice who enjoys all the tithes,

whereas a vicar draws only a part. The word is also widely used in the U.S.A. for the incumbents of parishes in the Protestant Episcopal Church. The Roman Catholics use it mainly for the head of a religious house or college. At Oxford the heads of Lincoln and Exeter Colleges are known as rectors. In Scotland each of the four universities has a lord rector. He is elected by the students every three years and the office usually falls to a prominent politician or man of letters. Certain Scottish schools, e.g. Glasgow Academy, call their headmaster the rector. *See* Benefice; Ecclesiastical Law.

Rectum. Terminal part of the large intestine, ending in the anus. It is about 8 ins. long. Dilatation of the veins in the mucous membrane in the lower part of the rectum gives rise to haemorrhoids or piles. This condition may be due to weak walls in the blood vessels, or to back pressure resulting from constipation, or to fluid motions failing to dilate the anus and so aid circulatory change. Cancer of the rectum is most often a disease of middle or late life. The early symptoms are sensations of uneasiness, constipation with intermittent diarrhoea, and passage of bloodstained mucus. If the disease is diagnosed early, complete removal and recovery may be possible. A rectal fistula is an abnormal passage between the rectum and an adjacent organ or the external surface. The commonest form is a *fistula-in-ano*. A complete fistula opens internally into the bowel and externally through the skin.

Inflammation of the rectum is known as proctitis, and may be due to chronic constipation, new growths, or threadworms. Pro-lapse of the rectum is a condition in which a part of the tube protrudes through the anal orifice. It occurs in children and weakly persons, or may be the result of chronic constipation, piles, and other disorders of the rectum. In the early stages cure may be hoped for by relieving the cause of the condition, particularly in children. In adults, operative treatment may be necessary. Ulceration of the rectum may be due to chronic inflammation, dysentery, tuberculosis, or syphilis.

Reculver. Locality in Kent, England, the site of the Roman Regulbium. It is on the S. shore of the Thames estuary, 3. m. E. of Herne Bay. There are some remains of a fortress, and two towers, known as The Sisters, standing out boldly on the cliff, form a well-



Reculver, Kent. The towers called The Sisters, a well-known landmark for mariners

known landmark. They are remains of an E.E. church and belong to Trinity House. The modern church, S. Mary's, contains some relics of the earlier one. British and Roman coins have been found at Reculver. *See* Richborough.

Recuperator. Artillery device to return a gun barrel to the firing position after recoil. Recuperators are either spring- or air-operated. When the barrel recoils upon discharge of the projectile, the springs or compressed air in the recuperator act as a brake. Immediately the barrel has recoiled to its permissible maximum, the recuperator springs (or air) reassert themselves and, through a piston, push the barrel forward on its carriage to the firing position. The recuperator is initially in a state of compression to prevent the barrel sliding back in its cradle when the gun is elevated. Its forward movement is controlled by a throttle to prevent too rapid a return after firing. Heavy artillery pieces have two recuperators, mounted side by side on top of the barrel.

The apparatus of the same name used in metallurgy is described under Regenerator.

Recusant (Lat. *recusare*, to refuse). Name formerly applied to those who refused to conform to the Church of England. The word was mostly used in the 16th and 17th centuries with reference to Roman Catholics who evaded the penal laws which obliged them to attend services in the English churches. While poor recusants were imprisoned and exiled, fines imposed on the wealthier recusant county families were a considerable asset to the exchequer. *See* Toleration.

Red. One of the primary colours. The red rays of light are the least refracted in the spectrum. Red colouring matters may be divided into three classes: (1) natural; (2) synthetically prepared; (3)

mineral. The first includes limawood, barwood, camwood, etc., madder, cochineal, etc.; the second alizarin, etc.; and the third ferric oxide, red lead, sulphide of mercury, etc. Many of these colours are described under their separate names in this work. *See also* Dyes; Light; Pigment.

Red Admiral (*Vanessa atalanta*). Common British butterfly with a wing expanse of nearly 3 ins. The forewings are velvety black at the tips with white spots; then there comes a scarlet band, and towards their bases the wings are deep brown. The hind wings are also deep brown with a scarlet border. Common in gardens and hedgerows towards autumn, the butterfly is partial to rotting fruits. A few individuals apparently survive the winter, and a number of migrants arrive from the Continent in spring, to produce the abundant autumn generation of British-born individuals. The caterpillar is spiny and variably coloured; it feeds upon the common nettle and lives in a shelter formed of its leaves drawn together with silk.

Red Air Force. Popular name for the air force of the U.S.S.R. It was developed in the 1920s, chiefly under German direction; by the treaty of Versailles, Germany had been forbidden to build military aircraft within her territory, and the Red Air Force gave her technicians opportunities of trying out new ideas in construction and tactics. Few machines in the force were of Russian design, most being German and American, while all the aero engines were of British, French, German, or American design, built in Russia under licence. In 1939 there was only one Russian-designed aero engine in production.

When Germany invaded Russia in 1941, the defenders could put in the air a front-line strength of 160 squadrons: 35 fighter, 40

bomber, and the remainder reconnaissance; reserves totalling some 3,000 machines. Most of the bombers were of medium type, and there was no strategic force of heavy bombers capable of deep penetration into enemy territory. The Soviet aircraft industry was at first unable to supply the numbers of planes required, while a large proportion of those in service proved unsatisfactory. Russia still largely depended upon British and American machines. But as the war progressed, the aircraft industry underwent such rapid expansion that by 1945 about 75 p.c. of Red air force machines and engines were Russian-designed and built. Outstanding were the Yak fighter, the Stormovik assault bomber (army support), the Petlyakov twin-engined dive-bomber, and the Tupolev heavy bomber.

Few details were made public regarding the strength of the post-war Red air force, but in 1948 it was estimated that Russia could put some 3,500 aircraft into operation within a few weeks.

Redan. Military term for a V-shaped salient pointing towards the enemy. With the advance of modern military science it is almost obsolete, being chiefly remembered in connexion with the redans defending the S. side of Sevastopol, against which the British made a costly and unsuccessful attack, Sept. 5, 1855.

Red Army. Popular name for the military land forces of the U.S.S.R. The Red army developed from Bolshevik guerrilla forces raised during the revolution of 1917, and first became a cohesive fighting unit in the Russo-Polish campaigns of 1919-20. Originally it was on a strictly proletarian basis: officers and men received the same rate of pay, lived and messed together, and there were no badges or other insignia of rank. In 1930 the Red army was reorganized by German instructors. The officers were granted military status with fixed ranks, distinctive insignia, and regular promotion, while the men were given privileges denied to civilians. To prevent the officer caste from becoming a threat to the political regime, every formation of battalion strength and over had attached to it a political commissar, who had authority over military commanders. But this chaotic state of affairs was ended in 1939 by the abolition of the post of political commissar.

At the outbreak of the Second Great War, the Red army had an

effective strength of 1,600,000 men; by the end it had nearly 16,000,000. In 1948 it was reduced to a peacetime establishment of 1,900,000, including para- and semi-military formations, militarised police, and troops of the ministry of the interior. Service is compulsory for all men between 16 and 60, and the average annual intake is 1,500,000. Peasants, many illiterate, form the bulk of the infantry, but the mechanised formations are all drawn from industrial workers who are members of the Communist party. Cadets for commissions attend courses in military and political theory. See Russo-German Campaigns.

Red Bean (*Sophora secundiflora*). Small evergreen tree of the family Leguminosae. It is a native



Red Bean. Foliage and flower spike

of Texas, U.S.A. The glossy leaves are broken up into oval leaflets, and the violet flowers are in long sprays. The seed-pods contain five or six hard, glossy, scarlet beans which contain a poisonous alkaloid having physiological effects similar to the action of tobacco. They were formerly much used by the Indian tribes as an intoxicant, the bean being reduced to powder and dissolved in *mescal*, the spirit distilled from the fermented sap of the agave. Half a bean produced a delirious exhilaration, followed by a sleep lasting two or three days; a whole bean would kill a man.

Redcar. Mun. bor. and seaside resort of the N. Riding of Yorkshire, England. It is 8 m. N.E. of Middlesbrough, with a rly. station. There is a magnificent stretch of sandy beach, with good bathing and golf links, and the town is a popular resort especially for the people of Middlesbrough and Stockton. Four race meetings are held annually. The bor. includes Coatham. Pop. 26,500.

Red Chalk. In geology, bed 4 to 10 ft. in thickness found in the counties of Norfolk and Lincs, England. It occurs beneath the

lower chalk and is equivalent to the gault in S. England.

Red Clay. Material which is being deposited in the abyssal depths of the oceans. It is composed of insoluble remains of small sea creatures (plankton), wind blown dust, volcanic ash, and meteoric dust. As these materials sink slowly through the water their soluble constituents are removed and the residue only accumulates. The rate of sedimentation is estimated at half a centimetre in 1,000 years. Whales' earbones and sharks' teeth (many of extinct species) have accumulated in the Red Clay and are commonly dredged up. Manganese oxide nodules and zeolites also occur. No deposit corresponding to the Red Clay has been found in the sediments now uplifted and exposed on land, a fact which supports the theory that ocean basins are permanent features.

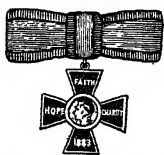
Red Crag. In geology, a group of current bedded sands of Pliocene age. They are found in England in a roughly triangular area between Walton-on-the-Naze, Sudbury, and near Aldeburgh, in Suffolk and Essex.

Red Cross. International emblem of an organization whose history is described under International Red Cross.

Red Cross, AMERICAN. Relief organization of the U.S.A. inaugurated 1881, mainly through the efforts of Clara Barton (1821-1912), first president. It was re-organized in 1905 under a charter granted by congress, and in 1947 a revision of this charter placed it under a board of 50 governors. It not only gives aid to the sick and wounded during war, but relieves the victims of floods, fires, tornadoes, epidemics, and other calamities at all times, whether at home or abroad. Among its activities are public health services; e.g. for accident prevention, home nursing, first aid in drowning. In 1945 a civilian blood donor service was started. With headquarters in Washington, D.C., there are 3,751 local chapters and over 5,000 branches.

Red Cross, ROYAL. British decoration instituted in 1883 for nurses who tend the sick and wounded of the army and navy. It is granted in two classes; recipients of the first class are entitled as members to the letters R.R.C. after their names, those of the second class as associates use the letters A.R.R.C. Members wear a cross, enamelled red, edged with gold, having on the arms

thereof the words faith, hope, charity, and the date 1883; the centre bears the royal and imperial effigy; on the reverse are the words, date, cipher, and crown.



Royal Red Cross.
Decoration for nurses

Associates wear a cross of the same form and size, but of frosted silver, upon which is superimposed a Maltese cross, enamelled red, the centre bearing the royal and imperial effigy; on the reverse are the words, date, cipher, and crown above-mentioned. The cross is worn on the left breast attached to a dark blue riband, edged red, and tied in a bow; it is worn only on indoor uniform. All members of the nursing service are eligible for this decoration, which may be conferred also on other persons, British and foreign, who render service to sick and wounded British soldiers and sailors.

Red Cross Knight, THE. Principal character of Book 1 of Spenser's *Faerie Queene*. He is regarded as a personification of reformed England, or as symbolising the victory of holiness over sin. In one line he is referred to as Saint George of Merry England. With Una, personified Truth, he sets forth as her champion to slay the dragon, which is Falsehood. Deceived by the wizard Archimago, he gets separated from Una, and they meet many adventures separately before the dragon is slain and they are reunited and betrothed.

Red Cross Society, BRITISH. Founded in 1870 to tend the sick and wounded in war and to alleviate distress in peace. The society is autonomous and independent, but adheres to the rules of the International Red Cross (*q.v.*). In peace time it instructs in first aid and maintains ambulance and X-ray services in country districts. In war it supplements the civil and military medical services and provides amenities which fall outside official provision.

In both Great Wars this society and the Order of St. John formed a joint body, the Red Cross and St. John war organization, the existence of which did not affect the status, duty, and privileges of either body. In the Second Great War this was the only body authorised by the British govt. to send standard parcels, of which 19,326,196 were dispatched, to prisoners of war. Through a wounded-and-missing department it searched for

missing men of British and dominion services and merchant navies; it arranged letter services to occupied territories; trained 500,000 men and women of the civil defence services in first aid; established hospitals and homes to accommodate 15,000 patients; set up nearly 200 depots for storage of medical supplies against any emergency; augmented civil defence services with ambulances, personnel, auxiliary hospitals, medical stores, clothing, and monetary grants. Its activities were made available to all Allied countries, and over £1,000,000 worth of stores and medical supplies were sent to Russia. Red Cross welfare teams accompanied the armies on all fighting fronts, and four ambulance trains and 1,200 vehicles were provided. In 1939 the duke of Gloucester's Red Cross and St. John appeal was launched to raise funds, and by June 30, 1945, over £53,000,000 had been subscribed. In a penny-a-week fund, 14,000,000 workers contributed a total of £17,622,225. The Red Cross society's offices are at 15, Grosvenor Crescent, London, S.W.1.

Red Deer (*Cervus elaphus*). Largest species of deer now found in Great Britain. It was formerly common in the forests throughout the British Isles, but now occurs wild chiefly in the Highlands of Scotland and in the western islands, on Exmoor, and in Kerry. The strain was greatly modified in the 19th century by the importation of stags from Germany and Austria. The stag stands about 4 ft. high at the withers, the hind being about 6 ins. shorter, and the weight of a fine specimen may attain 400 lb. The pelt is reddish brown, sometimes tinged with grey on the upper parts, and much lighter beneath, with a yellowish patch on the rump. A reddish tinge is peculiar to the summer months. The Irish variety has a white blaze on the forehead. Fawns are lighter in tone, and are spotted with white.

The stags carry fine antlers, the number of branches or tines roughly indicating their age. In a good specimen the antlers may measure a yard in length, and have an expanse between the two tips of about 40 ins. They are shed annually about March and at once begin to grow again, being covered with hairy skin, known as the "velvet," until they reach completion about Sept. During this time the stags are timid and harmless, but the completion of the growth of the antlers marks the

beginning of the mating season, when the stags fight furiously for possession of the hinds. The stag is polygamous, and has even been known to collect a harem of fifty hinds. The fawns are usually born in May and June, one at a birth.

Red deer feed upon grass, young shoots, fungi, and beech nuts, and are said to eat the dry seaweed on the shores of some of the western islands of Scotland. They are also fond of licking rocks washed by the waves for the sake of the salt. They usually feed in the early morning and late in the afternoon, lying up in shady spots during the hotter hours. They have keen scent and are wary, so that the deer stalker in the Highlands has need of all the skill and patience he can bring to bear on his pursuit. See Antler; Deer; Deer-stalking.

Red Deer. City of Alberta, Canada. It is an important junction on the C.P.R. and C.N.R. It is 90 m. N. of Calgary, and stands in the centre of a farming district on the Red Deer river. Coal is mined in the vicinity, there are lumber mills and elevators, and the industries include creameries and making creosote. Pop. 2,924.

Redditch. Market town and urban dist. of Worcestershire, England. It stands on the Arrow,

13 m. S. of Birmingham, with which it is connected by rly. and bus. Long established industries are the manufacture of needles and pins and fishing tackle; motor and pedal cycles, motor and aeroplane parts, electric batteries, and forgings and castings, are also turned out. Remains of the Cistercian abbey of Bordesley, 1138, are of historical interest. Market day, Sat. Pop. est. 28,000.

Reddle. Most earthy variety of the mineral haematite. Red in colour, it is used in paint, for polishing glass, and in making crayons. A reddleman was one who travelled with this commodity; such was Diggory Venn in Hardy's *Return of the Native*.

Redeemer (Lat. *redimere*, to buy back). Term used as a synonym for Jesus Christ because of His work in redeeming the world from sin. The Redemption is a theological term for this work. See Atonement; Jesus.

Redemption. In financial matters, the repayment of a loan after a certain time, and on stated terms. Municipalities often



Redditch arms

raise money by redeemable stock, as it is called, one condition being that at the end of a certain time the lender shall be repaid, sometimes with a small premium. Debenture stock issued by public companies is often redeemable.

Redemptorists (Lat. *redemptor*, redeemer). R.C. religious congregation of priests and lay brothers (about 7,000 strong), called the Congregation of the Most Holy Redeemer. It was founded by S. Alphonsus Liguori at Scala in 1732 to undertake missions and retreats. The Redemptorists came to England in 1843, and S. Mary's, Clapham, founded in 1848, became the provincial house in this country. The first English provincial—Newman's friend, Robert Coffin—was later bishop of Southwark. Today the English province comprises eight houses, and has a dependent vice-province in S. Africa. S. Alphonsus also founded an order of nuns—commonly called Redemptoristines—who are contemplatives devoting themselves to prayer and penance. They wear a distinctive habit, red tunic, blue scapular, and white headdress with black veil, and their English house is at Chudleigh.

Red Ensign: For this flag of the Merchant Navy, see Ensign; Flag and colour plate.

Redesdale. District of Northumberland, England. It consists of the valley of the river Rede, or Reed, and extends for about 20 m. from the Scottish border to the N. Tyne at Reedsmouth. The dale forms one of the main routes between England and Scotland, and the men of Redesdale won notoriety as doughty fighters in many a border foray. Otterburn is at the S. end of the valley, in which are the Roman station of Bremenium, and Newcastle's water reservoir.

Redesdale, BARON. Peerage of the U.K. held by the family of Freeman-Mitford. John Mitford (1748–1830), a Northumberland landowner who became attorney-general in 1799 and speaker of the house of commons in 1801, was given the title in 1802 and assumed the additional name of Freeman. His son John (1805–86), was raised in 1877 to an earldom, but this title expired with him. In 1902 the barony was revived in favour of a kinsman, Algernon Bertram Freeman-Mitford (1837–1916), diplomatist and M.P. When he died, Aug. 17, 1916, it passed to his son David Bertram Ogilvy (b. March 13, 1878). He had one son, Thomas David (b. 1908, killed in Burma, 1945), and six daughters.

Of these Nancy (b. 1904) was a successful novelist, among her books being *Pigeon Pie*, 1940, *The Pursuit of Love*, 1945, *Love in a Cold Climate*, 1949; Diana (b. 1910) married 1st, Bryan Guinness; 2nd, Sir Oswald Mosley (*q.v.*); Unity Valkyrie (1914–48) gained notoriety as a friend of Hitler.

Red Flag, THE. British Socialist song, written in 1889 by Jim Connell. He intended it to be sung to the air of *The White Cockade*, but as this was in use about the same time for a vulgar music-hall song the hymn-tune *Maryland* was used instead. Bernard Shaw said the tune sounded like "the funeral march of a fried eel," and Bantock at one time reset a Beethoven air for it, but this was not generally adopted. The song has often been sung by Socialists to express defiance or triumph, e.g. in the house of commons after their election victory of 1945. Red is traditionally recognized as the symbolic colour of international Socialism, hence the red field of the flags of the various republics of the U.S.S.R. and the use of the term "red" to signify an extreme Socialist. The words of the first verse and refrain of *The Red Flag* are as follows:

The people's flag is deepest red;
It shrouded oft our martyred dead,
And ere their limbs grew stiff and cold,
Their heart's blood dyed its every fold.

Then raise the scarlet standard high!
Within its shade we'll live and die!
Though towards finch and traitors
sneer,

We'll keep the Red Flag flying here!

Red Fleet. Popular name for the naval forces of the U.S.S.R. As her European coastlines, except in the N., border on inland seas, the principal strength of the Russian fleet has always been in small craft. At the outbreak of the Second Great War, all the battleships and many cruisers were vessels of the old imperial navy, the only recent ships being 23 destroyers, 134 submarines, and 150 torpedo boats. This fleet was strengthened by the loan of the British battleship *Royal Sovereign*; and one new cruiser and a number of destroyers were commissioned. Throughout hostilities the Red Fleet was in no sense a sea-going force; its units played a minor role, and then only in Russian waters, in the escort of Allied convoys. Russian destroyers, submarines and coastal craft were active in the Baltic and off the Crimea, but the seamanship of crews was generally of a low standard. In 1940 the practice of appointing political commissars to every ship was abolished. By 1943

the Red Fleet consisted of three battleships built between 1911 and 1915; eight cruisers, the largest 8,000 tons, commissioned between 1915 and 1940; 140 submarines, all modern, many seized from Germany; 50 destroyers, of which at least half were 15 years old; and 200 torpedo boats, nearly all modern. The original division into Baltic and Black Sea fleets lapsed with the completion of the Baltic White Sea Canal. Principal dockyards are at Nevsky, Leningrad, and Kronstadt.

Redgauntlet, A TALE OF THE EIGHTEENTH CENTURY. Nineteenth of the *Waverley Novels* by Scott. It abounds in scenes of abiding interest and charm, touched with the glamour of expiring Jacobinism, and told in part through the media of letters and journals. The period is 1766, and the scenes are laid in Cumberland and the Scottish borders of the Solway. Alan (or Saunders) Fairford recalls Scott's father; Alan Fairford is autobiographical; Lillias Redgauntlet is a memory of the author's youth; the romantic Darsie Latimer is a portrait of Scott's friend, Will Clerk. Wandering Willie, the blind fiddler (whose weird Tale of the Redgauntlets fired the imagination of Stevenson, and is by many regarded as the finest short story in the language), Nanty Ewart, Peter Peebles, and the Quaker Geddesses are notable characters.

Redgrave, MICHAEL SCUDAMORE (b. 1908). British actor. His mother was the actress Margaret



Michael Redgrave,
British actor

Scudamore, and he was born March 20, 1908. Educated at Clifton and Magdalene College, Cambridge, he taught at Cranleigh, but in 1934 joined the Liverpool repertory company and in 1936–38 acted with the Old Vic players. He made a reputation in *Thunder Rock*, 1940, and added to it in a revival of *A Month in the Country*, 1943, and *Uncle Harry*, 1944. Entering films in 1938, he appeared in *The Lady Vanishes*, *The Stars Look Down*, *The Way to the Stars*, *The Captive Heart*, and also *Kipps*. Redgrave married the actress Rachel Kempson.

Red Guard. Former regiment of the Soviet army. Red guard units were raised in all the principal Russian cities after the Ger-

man invasion of 1941, and took an oath to "stop Hitler or die." They were abolished at the end of the war.

Redhill. Market town of Surrey, England, part of the mun. bor. of Reigate. It is 21 m. S. of London, on the Brighton road A 23, and is an important rly. junction. The town takes its name from the red sand formerly dug on the common here.



Redhill, Surrey. Cross roads in the centre of the town, looking up Station Road

Fuller's earth is obtained in the neighbourhood. The Philanthropic Society maintains a large reformatory farm-school for boys here. At Earlswood is an institution for mental defectives; also a common, upon which also stands a county hospital. *See* Reigate.

Red Hill. Pre-historic mound of burnt earth, found especially in Essex. Scattered along estuary and tidal river margins, not more than 5 ft. above high-water mark, they are low, flat masses, varying in size from a few rods to several acres. Some hundreds are extant. An exploration committee appointed in 1906 spent four seasons in excavating typical examples, and presented reports to the Society of Antiquaries in 1908 and 1910. It was found that the loose burnt clay was sometimes intermingled to the extent of about 1½ p.c. with fragments of coarse earthenware called briquetage, comprising so-called firebars, pedestals, and T-pieces. Occasional Samian potsherds apparently date the mounds not later than the 1st century A.D. Fragments of charcoal, never exceeding 1 in. across, came from furze, broom, and the commoner forest trees.

Similar briquetage found in Lorraine and Belgium pertains to open earthenware furnaces, using brushwood fuel, for crystallising common salt from brine. Whether the Essex Red Hills are the debris of salt-works, kelp-works, or other industries, whether they mark the actual sites of the clay-burning, and what purpose, if any, was

served by the burnt earth, are still under investigation by scholars.

Red Indian. Popular name for the American Indian. They were so called from the colour of the skin. *See* American Indians.

Redistribution. In politics, a change in the size and number of the constituencies returning members to parliament. It is usually made to meet the changes brought

about by the movements of population. In the U.K. the first great redistribution of seats was effected by the Reform Act of 1832, when a large number of small boroughs were deprived of the privilege of sending two members to parliament, and large places were given

it. Time made further less drastic redistribution necessary in 1867, 1885, and 1918.

The Second Great War having occasioned exceptional movement of the population, the Redistribution of Seats Act, 1944, temporarily sub-divided 20 large English constituencies into 45, and set up boundary commissions to undertake a full-scale redistribution. At the 1945 general election there were 640 seats. The boundary commissions' reports, 1948, gave England 489 single-member constituencies, Scotland 71, Wales 36, and N. Ireland 12, a total of 608, excluding the universities' and City of London seats. The latter were abolished by the Representation of the People Act, 1948, which created a further 17 new constituencies. The total of constituencies and of seats thus became 625, the average electorate being 56,758.

In some countries redistribution is brought about automatically. In Canada, for instance, the representation of Quebec in the house of commons is fixed at 65 members, and the other provinces send numbers that bear the same proportion to 65 as their population does to that of Quebec, the change being made after every census. *See* Commons, House of; Representation.

Red Lead. Commercial product which has the chemical composition of minium (*q.v.*).

Red-letter Day. Saint's day or feast marked in the Church calendar by red letters. Hence the term is commonly used for a day made

memorable by some particularly desirable event.

Redmarley d'Abitot. Village of Worcestershire, England. Situated 9 m. W. of Tewkesbury in the extreme S.W. corner of the co., it stands on the summit of a hill, Red Marley, which is used for R.A.C. reliability trials of cars. The village consists of timbered and half-timbered houses. A former village of Redmarley now forms part of Great Witley.

Redmond, JOHN EDWARD (1851-1918). An Irish politician. Born at Ballytrent, he belonged to a family of landowners long associated with co. Wexford, his father and grandfather having sat in parliament for Wexford borough. Educated by Jesuits at Clongowes, and at Trinity College, Dublin, John became a clerk in the house of commons and a barrister, but in 1881 turned to a political career and was returned as Nationalist M.P. for New Ross. His abilities as a speaker and family connexions made him prominent in the party; he was sent to Australia to collect funds, but in 1887 he suffered a short imprisonment under the Crimes Act.

When the split in the Nationalist party occurred, Redmond adhered to Parnell, and on his death



John Redmond, Irish politician Russell

he was chosen leader, and this position he retained until his death. In 1885 he was returned for N. Wexford, and from 1891 onward represented Waterford city.

Under Redmond's leadership the Nationalists worked in parliament by constitutional means. He was a member of the land conference of 1904, and after the Liberals came into power in 1906 he obtained from them several measures for Ireland. After the first election of 1910 his party held the balance of power in the house. He accepted warmly the Home Rule bill of 1912. Redmond showed a willingness for concessions to Ulster, was embarrassed by the enrolment of Irish volunteers, and was a member of the abortive conference at Buckingham Palace in July, 1914.

The growth of the Sinn Fein movement was a terrible blow to

his power, work, and hopes, even though Home Rule in a suspended fashion became law in 1914. The divergence between him and the Sinn Feiners widened when, on the outbreak of the First Great War, Redmond promised the support of Ireland. He did something to encourage recruiting, but refused to join the coalition cabinet in 1915. In truth, he could no longer rely upon his people, and another blow was the Irish rebellion of 1916. Meanwhile he secured for Ireland exemption from conscription, and was a member of the Dublin convention; but before the triumph of Sinn Fein at the general election he died, March 6, 1918.

Redmond's career as an Irish leader was a failure; the middle course he sought to steer was not acceptable to the majority of the nation, with whom he lost touch. But in parliament he was a success. He was a finished speaker, almost an orator of the old school, and his knowledge of the forms and procedure of the house of commons was profound. He married an Australian, Johanna Dalton, and had a son and two daughters. *Consult* Life, D. Gwynn, 1932.

Redmond, WILLIAM HOEY KEARNEY (1861-1917). Irish politician, younger brother of J. E. Redmond. Educated by the Jesuits at Clongowes, he abandoned an army career for politics, and was twice jailed for his share in the land league movements. Nationalist M.P. for Wexford borough, 1883; for Fermanagh, 1885; and for E. Clare, 1892, he supported Parnell in the split of 1890, and remained an active follower of his brother both in and out of parliament. At the outbreak of the First Great War, although over military age, he took a commission in the Royal Irish regt., and publicly urged other Irishmen to enlist. As a major, he died June 7, 1917, of wounds received in leading an attack near Wytschaete.

Redon. Town and river port of France. In the dept. of Ille-et-Vilaine, it stands on the estuary of the Vilaine and on the canal between Brest and Nantes. The chief building is the Gothic church of S. Sauveur; its earliest part dates from the 12th century and it has a detached belfry. The Benedictine abbey, founded here about 820, was long a famous religious house. Pop. 7,000.

Redoubt. Military fortification entirely enclosed by earthworks. It is principally used for resisting infantry attack, and seldom as part of a permanent defence system,

for it offers a prominent target for enemy artillery. Redoubts are set up as supports for the second line of defence or for defending open lines of communication. In the present-day warfare of movement the redoubt has largely been replaced by the more mobile "box." *See* Knightsbridge.

Redpoll (*Carduelis flammea*). British song-bird. Closely related to the linnet genus, it is found



Redpoll. Crimson-headed song-bird related to the linnet genus
W. S. Berridge, F.Z.S.

chiefly in the N. districts of Great Britain; also in Europe, Asia, and N. America. The plumage is reddish brown on the upper parts, with a deep crimson crown, pink breast, and white under parts. In habits and song the redpoll much resembles the linnet. It feeds upon insects and seeds. *See* Eggs, colour plate.

Redress. Relief or reparation. Redress of grievances was a common phrase during the struggle in England between king and parliament in the 17th century. The house of commons then established the principle that redress of grievances by the king must precede a supply or a grant. *See* Charles I; Petition of Right.

Red River. Alternative name for the Hong-Kiang (*q.v.*), a river of S.E. Asia.

Red River. River of the U.S.A. The southernmost affluent of the Mississippi, it takes its rise near the E. boundary of New Mexico, and flows E. between Texas and Oklahoma, enters Arkansas, and runs S.E. through Louisiana. Its chief tributary is the Washita. Some of its waters are carried to the Gulf of Mexico by bayous. It is about 1,500 m. long, and is navigable for 1,250 m. Vessels of 4 ft. draught can ascend to Fulton, Ark., 508 m. up. At Denison (*q.v.*), Tex., is the largest earthen dam of its kind in the world.

Red River. River of N. America. It rises within a few miles of

the source of the Mississippi on the Height of Land in Minnesota, U.S.A., and flows S., then W., and finally N. between N. Dakota and Minnesota into Manitoba, Canada, where it enters Lake Winnipeg after a course of 700 m. It traverses an almost level plain formerly covered by Lake Agassiz; here wheat is produced in great quantities. The river is liable to floods, since the upper ice melts before the more northerly lower ice. It is navigable from Winnipeg to Grand Forks, and in flood time small steamers are able to navigate one of its branches through Lake Traverse to the Mississippi. Its length is 700 m.

Red River Settlement. A former colony in Canada, lying in the valley of the Red River, S. of Lake Winnipeg, now part of the prov. of Manitoba. It was founded in 1811-12 by Thomas, 5th earl of Selkirk. By 1836 the Hudson's Bay Company had acquired full rights of control in the settlement, but when in 1869 the company's rights were transferred to the dominion of Canada, there was strong opposition among the population of this district, largely of mixed French and half-breed blood. Under the presidency of Louis Riel (1844-85), a provisional government was set up to oppose annexation, but the rebellion was suppressed by a mixed Canadian and British force dispatched under command of Wolseley (*q.v.*), who entered Fort Garry in 1870.

Redroot. Alternative name for the plant more commonly known as blood root (*q.v.*).

Red Rot (*Fomes annosus*). Woody fungus of the family Polyporeae. It is very destructive to coniferous trees. The visible portion, the spore-bearing body, is evident on the trunks and exposed roots of infected trees as a thick rugged knob, of which the white portion is pitted with the openings of the spore-bearing tubes. The mycelium penetrates the woody tissues and breaks down the cells, reducing them to a soft condition.

Redruth. Market town of Cornwall, England, part of the urban district of Camborne-Redruth. It is 9 m. W.S.W. of Truro and 63 m. W. of Plymouth, with a rly. station. It stands on a hill in the midst of a tin and copper mining district, and most of the industries are connected therewith, though various light engineering industries were established in the 1930s. Horse and cattle fairs are held. There is in



Redruth, Cornwall. Ruins of Carn Brea Castle

the district a famous school of mines. The chief buildings are S. Uny's church, town hall, market house, science and art school, and museum. In Camborne is S. Martin's church, which has an unbroken record of rectors since 1308. The church itself was restored in 1862. Near the town is Carn Brea, a rock 749 ft. high, on which are some remains traditionally associated with the Druids, and a ruined building known as Carn Brea Castle. In 1792 gas was first used here for lighting, being introduced by William Murdoch. Pop. (district) 35,170.

Red Sea. Arm of the Indian Ocean. It occupies the trough of a portion of the Great Rift Valley between Arabia and N.E. Africa, and extends from the isthmus of Suez 1,200 m. to S.S.E., to the Strait of Bab-el-Mandeb. At the N. end are two arms, the Gulfs of Suez and Akaba. From 100 to 200 m. wide, it has coasts fringed with coral reefs and lined by sandy deserts. Down the middle the channel is usually 3,000 ft. deep; the deep waters have a uniform temperature of 71° F., the surface waters vary from 77° F. in the N. to 84° F. in the S. Evaporation is continuous, and the hot humid air above the sea is depressing. Since the earliest times the Red Sea has been a marine highway, and has been used by steamers since the opening of the Suez Canal in 1869.

Owing to its position between Egypt and Arabia, the Red Sea was familiar to the ancients. It is the most important seaway referred to in the O.T., and was crossed by the Israelites in their exodus from Egypt. The exact spot where they crossed the sea is purely a matter of surmise, but in all probability it was near Baal-Zephon. The story of their passage and the pursuit and destruction of Pharaoh's host is recounted in Exodus, chap. 14, and the place reached on the other side is identified as Ayun Musa (Fountains of Moses). The Red Sea was known to the Romans as Mare

Rubrum, its two arms being called Heroöpoliticus Sinus and Aelanites Sinus, the Gulfs of Suez and Akaba respectively. Its historical associations are linked with those of Egypt (*q.v.*). The first historic civilization probably entered the land across the desert road from the Red Sea to Koptos. The Red Sea figured in all subsequent invasions, Assyrian, Syrian, Turkish, etc., and has always been a noted commercial highway. On Nov. 3, 1914, the British warship *Minerva* bombarded Akaba at the head of Akaba gulf, thus inaugurating the war against Turkey.

Early in the Second Great War, German and Italian aircraft and submarines rendered the Mediterranean passage to the British Middle East theatre untenable, so that all supplies and reinforcements to Egypt had to pass through the Red Sea after rounding the Cape. Although they achieved little, the Italian submarine and destroyer forces based on E. African ports on the Red Sea were a constant threat to Middle East convoys until the Italians in E. Africa were defeated in 1941. See Aden; Africa; Arabia; East Africa Campaign; Sinai; Suez.

Redshank (*Tringa totanus*). British shore bird. It belongs to the family containing sandpipers,



Redshank. Bird of the plover family, common on the sandy eastern shores of Britain
W. S. Berridge, F.Z.S.

snipes, and curlews. The plumage is pale brown on the upper parts, with a tail barred with black and white, and whitish under parts. In winter the plumage tends towards grey. The legs and feet are bright orange red, and the body is about 12 ins. long. Moderately common on the sandy shores of the E. counties of England, the bird feeds upon crustaceans and marine worms. Its wider range includes Europe, Asia, and Africa.

Red Spider. Name given to small bright red mites that infest various greenhouse plants besides others grown in the open. Under

glass the species *Tetranychus ulmi* attacks tomatoes, cucumbers, carnations, etc. In the open



Red Spider. Common garden pest

grew, they are caused by their piercing mouth-parts, which suck the sap, usually from the under side of the leaves. Treatment is spraying with lime sulphur.

Red Square. A vast thoroughfare in the centre of Moscow. A parade ground for displays and demonstrations, it is 900 yds. long and 175 yds. wide. On the W. is the Kremlin outside which is Lenin's tomb; at the S. end, the cathedral of S. Basil; at the N. end the historical museum. The name dates from much earlier than the revolution; in the time of Ivan the Terrible the square was the scene of public executions.

Redstart (*Phoenicurus phoenicurus*). Migratory song-bird. It is to be seen between April and Sept.



Redstart. European song-bird
W. S. Berridge, F.Z.S.

in most districts in England, but is nowhere common. It is found in the N. and central regions of the Continent. The cock bird has bluish-grey plumage on the upper parts, with black throat and bright bay under parts. The hen is reddish grey on the upper parts, with pale red breast and flanks and whitish throat.

Red Tape. Derogatory term applied to bureaucratic formalities and delays. It originated from the pink tape with which govt. dept. documents were tied. A civil service journal is entitled *Red Tape*.

Reducer. In photography, a chemical used to dissolve away part of the silver deposit when an image is found to be too dense. Reducers are known as cutting, proportional, or super-proportional, accordingly as they (a) attack the lighter deposits first, thereby increasing contrast; (b) act evenly on all deposits; or (c) attack the denser portions first,

thereby decreasing contrast. There are many reagents and formulae for these purposes.

Reducing Agent. In chemistry, a substance which removes oxygen, chlorine, etc., from compounds. Such substances are hydrogen, carbon, aluminium, etc. The term is used in a wider sense for any substances which bring about conversion into other substances. Some compounds themselves act as reducing agents, e.g. stannous chloride, used in testing for salts of mercury. Sulphurous acid, ferrous sulphate, sodium thiosulphate, and alcohol have also special applications in chemistry as reducing agents. Such agents have to be used when a reaction involving reduction takes place in solution. One of the chief is sulphuretted hydrogen, which reduces ferric salts to ferrous salts, arsenic acid to arsenious acid, chromates to chromic salts, and exerts its action on hypochlorites, nitrates, sulphites, and thiosulphates, with separation of sulphur. In analytical chemistry, the reducing gases of the Bunsen or blowpipe flame, borax, potassium cyanide, etc., are used in dry reactions. *See* Chemistry.

Reductio ad absurdum (Lat., reduction to an absurdity). In logic and mathematics, the demonstration of a proposition by proving the absurdity of that which contradicts it. Thus: two straight lines perpendicular to a third are parallel; if they were not, they would meet, and from the point where they met two perpendiculars to one and the same straight line could be drawn, which is absurd. *See* Logic.

Reduction. In arithmetic, term used for changing the denomination of a quantity without changing its value. Examples are the reduction of pounds, shillings, and pence to pence, or the reduction of separate fractions to a common denominator.

Reduction. In metallurgy, the liberation of a metal from its ore. Thus iron oxide is reduced in the blast furnace to iron. *See* Furnace.

Red Water. Disease which affects cattle at pasture. It occurs mainly from May to Oct., and is more frequent on high land which has never been cultivated. It is known in Scotland as moor ill. The cause of red water (so called from the red colour imparted to the animal's urine) is a minute parasite, similar to that which causes malaria in man, transmitted by a tick. Cattle develop a degree of immunity, but 5 p.c. of victims die. To prevent the disease it is necessary to keep the cattle off the land for two winters and a summer. *See* Cattle.

Red-water Tree (*Erythrophloeum guineense*) or SASSY TREE. Tall evergreen tree of the family



Red-water Tree. Leaves and flower-heads of this West African tree

Leguminosae. It is a native of W. Africa. It has small yellow flowers in terminal clusters. When the tree is cut a red juice flows from the incision. The bark is said to be poisonous, and is used as an "ordeal" by the natives for testing the guilt or innocence of suspected persons. An allied species (*E. laboucherii*) is the Ah-pill of Queensland and other parts of Australia. It has close-grained, hard, red wood—the hardest produced by Australia. The aborigines make woomeras and spearheads from it.

Redwing (*Turdus musicus*). British song-bird. It is related to the thrush, which it greatly resembles in general appearance. It is a winter migrant from N. Europe, and as it feeds almost exclusively on insects, it often suffers great privation in severe weather. Usually found in cultivated areas, it possesses a clear, loud song.

Redwood. Large evergreen tree of California, described under its botanical name of Wellingtonia.

Redwood, HUGH (b. 1883). A British journalist. Born at

Bristol, Feb. 15, 1883, he was educated at the cathedral school, and was a reporter on the Western Daily Press during 1898–1905. From the editorial staff of the Central News agency he went in 1919 to be successively foreign, night, and deputy editor of the Daily News (later News Chronicle), of which in 1934 he became religious editor. Redwood was associated with the evangelising work of the Salvation Army, which he described in God and the Slums, 1930, and was president of its goodwill league.

Ree. A lough or lake of Eire. Formed by the expansion of the river Shannon, it lies between the cos. of Roscommon, Longford, and Westmeath, and contains a number of small islets. It is 17 m. long and from 1 to 7 m. broad.

Reed (*Phragmites communis*). Large perennial herb of the family Gramineae. It is a native of Europe, Asia, Africa, America, and Australia, growing on the margins of lakes, streams, and up wet sea-cliffs. It is of erect growth, the stout, round stems attaining a height of 10 to 15 ft., with broad, flat, rigid leaves. The flowers are gathered in a large, oval, purplish plume. The reed is the predominant plant in the fens of East Anglia, and in the construction of the floating-fens which are found at the mouths of the Danube and in the Black Sea.

Reed In music, the medium by which vibrations are set up in certain organ stops (oboe, tuba, etc.), and in some orchestral instruments, oboe, clarinet, bassoon, saxophone, etc. The former are generally of metal, the latter of a kind of large grass which grows in S. Europe. A beating reed is one in which the edges of the tongue slightly overlap the slotted plate to which it is fastened. In the free reed the tongue passes through the opening. The harmonium



Redwing. Song-bird closely related to the thrush



Reed. *Phragmites communis* growing on the margin of a pool

and American organ are fitted with free reeds, without pipes; in other instruments a pipe enhances the tone and resonance of the organ reed. In the orchestral instruments the tube is essential, the reed being merely the excitatory medium.

Reed. In weaving, a comb-like portion of the loom, consisting of vertical, parallel wires, through the dents or openings of which the warp threads are passed. The reed serves to separate the warp threads, and to beat home the weft, against which its wires are driven by the sley, or oscillator of the loom. *See Loom; Weaving.*

Reed, DOUGLAS (b. 1895). British writer. He was a publisher's office boy at 13, but a sub-editor on *The Times* by 1924; for that newspaper he was assistant Berlin correspondent, 1927-35, then correspondent in Central Europe. Fame came with a trenchant political survey of Europe, *Insanity Fair*, 1938; *Disgrace Abounding*, 1939, and *All Our To-Morrows*, 1942, were equally read. In 1948 appeared *From Smoke to Smother*. Reed, who wrote a play, *Downfall*, 1942, and a novel, *The Next Horizon*, 1945, started in 1946 a weekly, *Tidings*.

Reed, EDWARD TENNYSON (1860-1933). British caricaturist and cartoonist. Born March 27, 1860, the son of Sir E. J. Reed, he was educated at Harrow. In July, 1889, he began to contribute to *Punch*, and was a member of its regular staff 1890-1912. He succeeded Harry Furniss in 1894 as parliamentary caricaturist, illustrating *Essence of Parliament*. Apart from this side of his work, his best remembered drawings were the *Contrasts* series, 1890-91, and *Prehistoric Peeps*, 1893. He died July 12, 1933.

Reed, TALBOT BAINES (1852-93). English typographer and writer of boys' books. Son of Sir Charles Reed, he was born at Hackney, London, April 3, 1852, and educated at the City of London school. In 1868 he joined his father's typefounding business, ultimately becoming managing director. In 1880 he contributed as a serial to *The Boy's Own Paper*, *The Adventures of a Three-Guinea Watch*. There followed other successful books, mainly of school life, e.g. *The Fifth Form at St. Dominic's* (1881), *My Friend Smith* (1882), *The Willoughby Captains* (1883), *Follow My Leader* (1885), *Reginald Cruden* (1885), *A Dog With a Bad Name* (1886), *The*

Master of the Shell (1887), *Sir Ludar*, a historical novel (1889), *Roger Ingleton Minor* (1889), *The Cock House at Fellsgarth* (1891), *Tom, Dick, and Harry* (1892). Reed was an authority on typography, and in 1892 cooperated in founding the Bibliographical Society. In 1887 he published a *History of the Old English Letter Foundries*, and in 1890 edited William Blades's *Pentateuch of Printing*. He died at Highgate Jan. 28, 1893.

Reed, THOMAS GERMAN (1817-88). British entertainer. Born at Bristol, June 27, 1817, he acquired theatrical and musical experience, and during 1838-51 was musical director at the Haymarket Theatre, London. In 1855, with his wife, he started popular dramatic entertainments, where light pieces by Robertson, Burnand, and Gilbert were performed, among his colleagues being John Parry and Corney Grain. Reed was instrumental in bringing Gilbert and Sullivan into partnership. His entertainments, first at the Gallery of Illustration, and later at St. George's Hall, were a feature of London life for a few years after his death at Sheen, March 21, 1888.

Reedbuck. Species of antelope found in Central and S. Africa. It is nearly 3 ft. high at the shoulder, and has pale brown hair on the upper parts with dingy white beneath. The horns are only about 12 ins. long, and rise nearly straight from the forehead, bending slightly forward at the tips. These ante-



T. German Reed, British entertainer



Reedbuck. Female of the antelope formerly common in the Transvaal
W. S. Berridge, F Z S.

lopes were formerly common in the Transvaal, but have now become rather rare. They do not congregate in herds, and are always found in the neighbourhood of water, but never in marshes.

Reed Bunting or **REED SPARROW** (*Emberiza schoeniclus*). Small European bird. Common in most parts of Great Britain, it frequents rivers or swampy ground, where it builds its nest among the reeds or in small trees. It is gregarious in habit, and feeds chiefly on water-plants, insects, and small molluscs. The head and throat of the male are black; the back and wings reddish-brown; the under parts, and a band around the neck, white. The eggs are drab-coloured, streaked with black and dull purple. *See Nest.*



Reed Bunting, on a rush

Reed-mace (*Typha latifolia*), **CAT'S-TAIL** or **CLUB-RUSH**. Tall perennial herb of the family Typhaceae. A native of Europe, N. and W. Asia, N. Africa, and N. America, it grows on the margins of lakes and rivers, and has a short, creeping rootstock from which the round erect stems rise to a height of 7 ft. The broad, nearly flat leaves may be 6 ft. long, with broad bases sheathing the stem. The female flowers are densely packed in a purple-brown spike or "mace" around the upper part of the stem, above which is the yellow "tail" of male flowers. There is a smaller and less common species (*T. angustifolia*) growing in pools and ditches, with narrower leaves and with the male and female spikes separated by a distinct interval of clear stem. It is often, but wrongly, styled bulrush (*q.v.*).

Reed Warbler (*Acrocephalus scirpaceus*). Migrant bird, a member of the family Sylviidae, which includes the chiffchaff, the warblers, and the whitethroats. It is a soberly coloured bird, breeding in reeds. It is locally but



Reed-mace. Leaves and flower spike

fairly evenly distributed throughout S. and midland England between May and Sept. It also breeds in W. Europe, and usually winters in tropical E. Africa.

Reef. Barrier of rock or sand extending along the shore of an island or continent. It is more closely defined by the international geographical congress committee as a submarine elevation which reaches within 11 fathoms of the surface. Such reefs are dangerous to shipping, and the most common are those formed by coral organisms. In mining the word is used for gold-bearing veins of quartz rock. *See* Coral; Coral Reef.

Reefing. Operation of partly furling sail by taking in reefs. Sails have upon them a number of short pieces of rope called reef points. When it is necessary to shorten sail by decreasing the area, these points are knotted around the foot of the sail. A vessel is close-reefed when all possible reefs have been made in her sails. Shaking out a reef is untying one course of reef knots and giving the sail a correspondingly greater area to the wind.

Reef Knot. Knot formed by passing the two ends of one rope through the loop formed by a second rope, whose two ends are similarly passed through a loop in the first. The two parts of one rope are passed above, and of the other below, the loop through which they are inserted. A longitudinal pull tightens the knot, which can be untied only by pushing the loops in opposite directions. One of the simplest forms of knot,



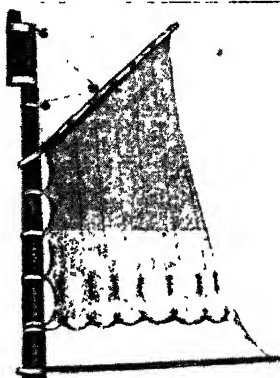
Reef Knot. The knot shown here is used in fastening two ropes together

this was used for securing the shortened canvas when reducing or reefing the area of a sail.

Reel. Mechanism for winding yarn into hanks. A simple form consists of a skeleton hexagonal revolving frame over the arms of which the yarn is wound from bobbins or other holders. A hand warp-reel measures lengths of yarns for testing purposes, and an indicator carried upon the apparatus indicates the length wound. Power-driven reels used in manufacturing operations are made long enough to wind a number of hanks simultaneously. By imparting a reciprocating motion to the skele-

ton frame on which the hanks are wound the yarn can be laid in diagonals instead of in plain circles. Yarn so reeled is called cross-reeled, and cannot be unwound by hand like the ordinary straight reeling used with hand-knitting wools. *See* Spinning.

Reel. Scottish national dance. It is performed by two or more couples, and called accordingly a foursome, sixsome, or eightsome reel. The music is provided by the bagpipes or fiddle; wanting these, the dancers sing their accompani-



Reefing. First reef taken in the fore-and-aft sail of a cutter or yawl

ment. It is a circular dance with quick, gliding movements, involving much whirling and a graceful forming of the figure eight, but it varies in different parts of the country. *See* Dancing.

Reeve (A.S. *geréfa*). Term applied to various public and private officials in England, chiefly in the Middle Ages. From Anglo-Saxon times the reeve was the steward or bailiff of an estate, who maintained order, collected dues, and supervised labour. Such was the reeve in Chaucer's *Canterbury Tales*. The word and office survive in the Scottish grieve. Dyke-reeves and field-reeves had special functions. In some coal mines a foreman or overseer is still called a reeve. Land confiscated by the crown was called reeve-land.

The word was also used of persons invested with certain public, especially magisterial, functions, as the sheriff (*q.v.*) or shire-reeve, the port-reeve (*q.v.*), and the borough-reeve. The manor-reeve was the elected representative of the villeins. The town-reeve was one of the four representatives of a town in the hundred court or shire court. In Canada the title reeve is given to the president of a town or village council.

The word reeve is probably unconnected with German *graf*, a count. Other words identical in form are reeve, the female of the ruff (*q.v.*), and the nautical term to reeve (a rope), to pass it through a ring or hole.

Reeve, HENRY (1813-95). British journalist and author. Born at Norwich, Sept. 9, 1813, he was educated at the grammar school there. He spent some time in travel on the Continent, and in 1837 secured an appointment under the privy council. Three years later he joined *The Times*, writing for it on foreign affairs, with wide knowledge especially of France and leading Frenchmen. In 1855 he became editor of *The Edinburgh Review*, holding that position together with that of registrar of the privy council, to which he had been appointed in 1843. He died Oct. 21, 1895. Reeve is best known as the editor of the *Memoirs of Charles Greville*, his predecessor at the privy council. He also wrote *Royal and Republican France, 1872. Consult* *Memoirs and Letters, J. K. Laughton, 1898; Letters of Charles Greville and H. R., ed. A. H. Johnson, 1924.*

Reeves, JOHN SIMS (1818-1900). British tenor singer. Born at Wool-

wich, Sept. 26, 1818, he sang the baritone part of Rudolph in *La Sonnambula* at Newcastle-upon-Tyne, 1839, and joined Macready's Drury Lane company as tenor, 1841. Having



J. Sims Reeves, British singer

studied abroad, he sang in opera in London in 1847, and then entered upon his long career as an oratorio singer, continuing to perform with outstanding success until his farewell appearance in 1891. Sims Reeves, also famed as a ballad singer, died at Worthing, Oct. 25, 1900. His *Life and Recollections* was issued in 1898, and a biography by C. Pearce in 1924.

Re-exports. Goods imported into a country and then exported. These are classified separately in the Board of Trade Journal. If import duty was paid when the goods were imported, it is normally repayable when they are re-exported. Often, however, goods imported for re-export are stored in bonded warehouses, and no duty is then payable. Such bonded warehouses take the place

in the U.K. of free ports and free districts elsewhere. The term entrepot trade is sometimes applied to the business of importing for re-export.

Refectory (Lat. *refectorium*, from *reficere*, to restore). Large hall in an abbey or kindred group of monastic buildings, where the monks or nuns took their meals. It was often a detached building, but sometimes was incorporated in the general ground-floor plan, being situated as a rule between the kitchen and the other offices of the establishment. See Abbey; Monastery.

Referee. One to whom any matter or question is referred for decision. The term is applied in several connexions. In law it may mean an official referee, who is an officer of the court. The matters generally referred to him by a court are those involving prolonged investigation of documents or some scientific or local investigation. A court is also empowered to refer specific matters to some specially qualified person as a referee. In general sports a referee is the official who controls the game or contest while it is in progress. See Arbitration; Boxing; Football; Umpire.

Referee, THE. Former London Sunday newspaper, which first appeared on Aug. 19, 1877. Henry Sampson (1841-91) was proprietor and first editor, and his pen-name of Pendragon led other contributors to take pseudonyms from Arthurian legend. G. R. Sims (1847-1922), as Dagonet, contributed the humorous feature Mustard and Cress from the start, and sport and drama were well covered. In 1931 the paper was renamed The Sunday Referee. Isidore Ostrer (*q.v.*) was proprietor from that year, with R. J. Minney editor from 1935. While the lighter features were still prominent, regular writers included Aldous Huxley, Bertrand Russell, Edith and Osbert Sitwell, and H. G. Wells. In 1939, when the circulation had reached nearly half a million, the paper was sold to Lord Kemsley and merged in The Sunday Chronicle.

Referendum. Direct appeal by a government or legislature to the electorate to ascertain their vote on a specific matter, *e.g.* prohibition or women's suffrage. The referendum has been widely used in Australia, where since 1901 some 25 issues have been submitted thereby to voters, all involving a change in the constitution, *i.e.* the transfer of certain powers from the

individual states to the federal government. Some written constitutions provide for the referendum when it may be desirable to revise the constitution. In Eire a referendum can be taken on any measure passed by the Dail if it is requested by one-fifth of the senate or one-twentieth of the electorate. Most states of the U.S.A. use the referendum for proposed amendments to their constitution. In the U.K., where the powers of parliament are not limited, the idea has met with little support.

Refinery. In metallurgy, a plant in which metals are purified by removing some or all of the unwanted matter present in the raw material. All metallurgical operations are refining processes, after the initial concentration of the ore. The term is, however, usually reserved for the final operation of improving the crude metal from the smelter until it has become pure. In some instances no refining of the metal first produced in the smelter is needed, particularly if the chief impurities are not harmful. For example, it is unnecessary to use super-purity zinc and electrolytic copper to make common brass, when spelter and blister copper are sufficiently pure. But small amounts of impurities often widely influence the properties of metals and alloys, and the tendency is to demand increasing purity, which necessitates bigger and more effective refineries. Commercial aluminium exceeds 99.5 p.c. aluminium, but this is unsuitable for some purposes and must be refined to more than 99.95 p.c. Small amounts of impurity have a deleterious effect on the conductivity of copper, and oxygen-free high conductivity copper normally exceeds 99.95 p.c., and good fire-refined copper is similarly pure. It is possible if needed to produce copper exceeding 99.999 p.c., and electrolytically refined gold or silver may exceed 99.95 parts per thousand. By special processes small amounts of most metals may be produced at extreme purities of the order of 99.99 to 99.999 p.c. or more; but these are not usual on the commercial scale. The layout of any refinery depends entirely on the processes to be used, which may be chemical, electrolytic, pyrometallurgical, or combinations of these and other processes.

Similarly, in oil technology, a refinery is a plant where crude oil is purified. In a petroleum refinery the oil is split into fractions,

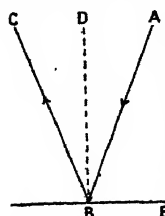
which are purified or refined and, if necessary, blended. The temperature of the crude oil entering the refinery is raised by passing it through heat exchangers, from which it goes to a fractionating column. It is not usual to complete fractionation in one operation, gasolene, kerosine, and gas oil being taken off in the first column. The residue is reheated and sent to a second column, at reduced pressure, where lubricating oil distillates and either asphaltic bitumen or waxy residual lubricants, are obtained. Various distillates and residues are sent direct to the cracking plant to increase the yield of gasolene and improve the quality of that already obtained.

Refining of gasolene removes or converts mercaptans and other objectionable sulphur compounds, and it involves either washing with strong sulphuric acid, followed by soda and water washes, or treatment with sodium plumbite, which converts mercaptans to disulphides. Sulphuric acid also removes substances which discolour the gasolene and cause gummy deposits to form in engines. Kerosine is refined by sulphuric acid wash and aromatics are extracted from it by liquid sulphur dioxide. Lubricating oils are treated with liquid propane to precipitate asphalt, then with solvents such as phenol and furfural to remove various gummy and aromatic compounds, and finally with acetone and benzol to remove wax. Certain special products such as transformer oils, medicinal oils, etc., need refining with fuming sulphuric acid.

Gases from the cracking plant are separated into their components by fractionating columns and are then used in various polymerisation and alkylation processes for the synthesis of gasolene. They are also the raw materials for the manufacture of a wide range of organic substances including synthetic rubber and plastics. Control of the main refining operations is largely automatic and is effected from a central control room.

Reflection (Lat. *reflectere*, to bend back). In physics, general phenomenon occurring in all kinds of wave motion. It is most noticeable in light. If a beam of light be reduced to a theoretical ray it is reflected in one direction, and it is said to undergo regular reflection. The point where a ray of light strikes the reflecting surface is the point of incidence. A perpendicular to the reflecting surface through this point is called the normal; the

angle the incident ray makes with this normal is the angle of incidence; the angle the reflected ray makes with it is the angle of reflection. The laws of regular reflection from a square are as follows: (1) The incident ray, the normal to the surface, and the reflected ray are all in the same plane. (2) The angle of reflection is equal to the angle of incidence. Without the phenomenon of reflection



Reflection. Diagram showing law of reflection. Ray of light ABC makes equal angles ABD, CBE with the perpendicular to the reflecting plane BE.

bodies not luminous in themselves would be invisible. If the reflecting surface is not smooth the incident radiation suffers diffused reflection over a wide range of angles.

The reflection of light and radiant heat is an important factor in the physics of the atmosphere. For example, a large proportion of the light which comes from the sun is reflected by clouds; a cloud will return 78 p.c. of the incident radiation, and the amount of reflection is virtually independent of the angle of incidence. See Light; Optics; Refraction.

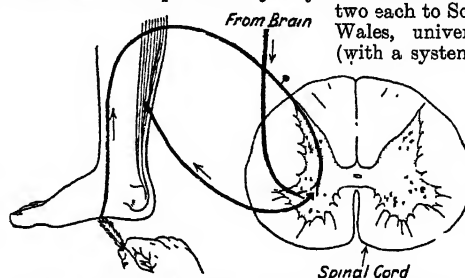
Reflex Action. Muscular action which is the result of an afferent impulse, i.e. an impulse originating in a stimulus external to the body and conveyed by a nerve to a part of the central nervous system, which then sets in motion the muscles necessary to produce the action. For instance, if the skin be pricked or touched with something hot, an impulse is carried by the nerve which has been stimulated to a nerve centre, and from this another impulse is sent down to the appropriate muscles, causing them to withdraw the limb from the source of pain.

Other instances of reflex action are the watering of the eye and the movements of the eyelids when a speck of dust enters the eye; the contraction of the pupil when a strong light falls upon it; and the pouring out of saliva or watering of the mouth which occurs at the smell or sight of food. A true reflex action is independent of the will and may occur in states of unconsciousness, as, for instance, the drawing away of the leg if the sole of a sleeping person be tickled. Nerve centres through which reflex

actions are carried out exist in the brain, the spinal cord, and the sympathetic nervous system. See Brain; Nervous System.

Reform Acts. In British history, name given to the series of Acts reforming parliamentary franchise and the composition of parliament, and designed to secure an adequate expression of the popular will in government. The formal title of these Acts is the Representation of the People Acts (*q.v.*). The most famous Reform Act is that of 1832.

For years before the introduction of Russell's first bill in 1831, a growing movement had demanded drastic parliamentary reform. The notorious constituency of Old Sarum returned two members for its heap of ruins; Manchester and Birmingham, with rapidly increasing industrial populations, were unrepresented. Russell's first bill was dropped, reintroduced, and rejected by the lords, Sept. 21. In Dec. he introduced a new bill which passed the commons in March, 1832, but was rejected by the lords on May 7. Grey and his cabinet resigned, and public feeling against the wreckers of the expected reforms ran high. Backed by the king's assurance of the creation of new peers to ensure passage, the Whigs resumed power and the bill became law on June 7. The county franchise was given to occupants of lands and tenements at annual rent of not less than £50, the borough franchise to occupants of houses or shops of £10 yearly



Reflex Action. A familiar example. The foot is drawn away if the sole is tickled; a sensory stimulus passes to a centre in the spinal cord, whence motor impulses are sent out to muscles that carry out the action. This occurs apart from any intention, but may be controlled by the brain, though the conscious prevention of the action may be impossible.

value. Fifty-six English boroughs were disfranchised, 30 had their membership reduced to one; 22 boroughs were created with two members each, and 20 with one member each.

Abortive attempts at further reforms were made by Russell, 1854; Disraeli, 1859; Palmerston, 1860; Gladstone, 1866. But in 1867

Disraeli carried through the second Reform Bill. Borough franchise was extended to all householders rated for poor relief, and to lodgers occupying lodgings of annual value £10; the county vote to persons holding leasehold and copyhold of £5, and to occupiers of £12 rateable value. This increased the electorate from 1,353,000 to 2,243,000. Redistributions were also effected, and supplementary Acts for Scotland and Ireland were passed in 1868.

Gladstone's, or the third, Reform Act was passed in 1884, followed by a Redistribution of Seats Act in 1885. This measure added some 2½ millions to the register. It made uniform the householder and lodger franchise throughout the U.K., created 33 new boroughs, increased the representation of several large centres, and gave Scotland 12 additional seats.

In 1918 another Reform Act was passed into law. This increased the electorate by some 8,000,000, and admitted a measure of woman suffrage to the extent of about 6,000,000. The franchise was given to men over 18 who had served in the forces, to all other men over 21 years with a six months' residence qualification, and to women over 30 who were either local government electors or the wives of such electors. No elector could vote for more than two constituencies, and all general election polls were to be held on the same day. The redistribution of seats added 31 to England, and two each to Scotland, Ireland, and Wales, university representation (with a system of proportional representation) being increased to 15. The total electorate of the British Isles was thus brought to over 21,500,000.

In 1928 an Act allowed all women over 21 to vote, and the number of electors was increased to about 27,000,000. The Representation of the People Act,

1945, reduced plural voting by abolishing the qualification (introduced in 1928) of a husband or wife in respect of business premises occupied by the spouse; and that of 1948 abolished all forms of plural voting and the university franchise, and enacted a complete redistribution (*q.v.*) of seats. See Commons, House of.

THE REFORMATION AND ITS EFFECTS

A. D. Innes, M.A., Author, *Cranmer and the English Reformation*

In addition to the companion article on the Renaissance, those on Calvinism: Lutheranism; Papacy; and Protestantism may be consulted; also the biographies of Calvin; Hus; Knox; Luther; Wycliffe, and other Reformers. See also England; Germany; Scotland, and other historical accounts; also Huguenots; Indulgence

The Reformation is the name given to the great religious revolution or reconstruction of Western Christendom which took place during the 16th century, issuing in the division of all Christendom into three sections: the self-styled "Orthodox" or Greek Church of the East, which had already, for many centuries, been parted from the West; the self-styled Catholic Church of Rome, acknowledging the supreme authority of the papacy; and thirdly, the whole group of Christian bodies which, whether they claimed or did not claim for themselves the title of Catholic, all stood outside both the Greek and the Roman Churches. These, being in agreement at least on the one point of repudiating the papal authority, presently received the common designation of "Protestant," although that term in its primary significance embraced only the adherents of one particular confession. The latter bodies claimed for themselves individually the name of Reformed Churches.

State of the Medieval Church

Periodically, during the Middle Ages, there was a demand for reformation; but that meant, not a revision of Christian beliefs, but reformation within the Church, the ecclesiastical body, reformation of system, of morals, of methods. Revision of claims to authority, and proposals for revision of doctrine were vigorously suppressed. Such demands were raised, not only by the laity, but among the clergy themselves. The distinctive feature of the 16th century Reformation was its insistence upon a revision of doctrine, which involved not merely reformation but reconstruction, a complete change in the relations of clergy and laity, which had not been contemplated by earlier reforming movements.

In the medieval Church, disciplinary movements had been for the most part of ecclesiastical origin, but such came in waves. The last had exhausted itself by the beginning of the 14th century. From that time various causes combined to set ecclesiastical authorities in antagonism to reforming movements. The long captivity of the papacy at Avignon shattered the ideal of Gregory VII and the great popes of the 12th and 13th centuries. An even

deadlier blow was dealt to the spiritual character of the papacy by the Great Schism. The slight and partial recovery which followed the council of Constance was itself followed by the appalling relapse, which culminated with the pontificate of Alexander VI. The need for reform at the close of the 15th century was making itself universally felt, and a vigorous reforming movement was actively at work; but it had not yet reached the supreme authority.

Spiritual and Secular Rivalry

The spiritual authority, therefore, had been without a spiritual reality for generations. To the people it had proffered not living faith, but dead formulas, not an inward religion, but outward observance; not worship of the Divine, but cultivation of the Divine favour through the medium of purchasable clerical favour; with the natural consequence that respect for the Church was at a very low ebb.

Other forces also were at work. Politically there was an immemorial rivalry between the authority of the Church and the authority of secular princes; secular princes were generally willing to resent papal assertions of authority which challenged their own, and to assert their authority over clerics in their own dominions in despite of ecclesiastical thunders. The vast accumulations of wealth in the hands of prelates and ecclesiastical bodies were a constant grievance of the laity. The clergy were by profession guardians of morality; their lapses from morality were therefore condemned with all the greater severity. Moreover, it was palpable that the clergy in the higher ranks concerned themselves at least as much with politics and essentially worldly affairs as with their pastoral functions.

There was nothing novel or unprecedented about these conditions. But in the past the ecclesiastical claims to authority had been most resolutely asserted in days when the ecclesiastical champions were conspicuously great men, or at least men with great ideals; whereas at the beginning of the 16th century the Church had reached its nadir. It was at its worst in respect of everything that had ever excited against it the denunciations of moralists and the

jealousy of lay magnates, while in addition to all this, the obscurantism which had once been in some sort a source of strength had become a cause of weakness.

The revival of letters was making it impossible to accept the limitations which the Church had imposed upon legitimate inquiry; and the inference that the Church's pronouncements, instead of being infallible, were born sometimes of ignorance, and sometimes of a fear of truth, was becoming irresistible.

The actual occasion of revolution was the action on the part of Leo X which roused Luther to challenge the papacy. That challenge raised the whole question of authority in the most acute form. The whole position of the medieval Church rested on the assumption that the Church was the Divinely appointed intermediary between God and man. The whole Lutheran or Protestant position assumes direct personal relations between God and the individual man.

Lutheranism undertook to challenge doctrines which were generally accepted, ostensibly on the ground that they were in contradiction to the teaching of Scripture; in fact they were in the main precisely the doctrines which involved the recognition of the priesthood as a necessary channel of grace. The challenge, therefore, however sincerely inspired by enthusiasm for truth and righteousness, was in effect anti-papal and anti-clerical; and therefore it attached to itself, or allied itself with, all the anti-papal and anti-clerical elements, which in themselves had no concern at all with doctrine.

Right of Private Judgement

The logical outcome of the Protestant position was the assertion of the right of private judgement; but that was not in theory the claim which Protestantism made. In theory it repudiated the authority of the Church, but substituted for it the authority of Scripture. Its weakness lay in this, that Scripture needs interpretation; and Protestantism provided no infallible interpreter. Protestantism, therefore, inevitably broke up into sects, each group offering its own interpretation, and pronouncing all antagonistic interpretation to be false and anti-Scriptural. In a world accustomed for centuries to recognize a single indisputable or unquestionable authority, the recognition of the right of private judgement appeared simply to spell chaos. Whatever might be the case in theory, Protestantism was in practice driven back upon the position that the state was the arbiter. Every state

of necessity sought to establish its own form of Church, whether the Church so established remained a part of the Roman organization or not; and each state claimed at its own will to prohibit or concede a limited toleration to other forms of Church government, doctrines, and observances. The broad line of demarcation was that between the states which in popular language were described as Catholic and Protestant, the states whose governments continued to recognize, and those which repudiated, the authority of the Church of Rome.

Revolt of Luther and Wycliffe

As the epoch of the Reformation is said to open in 1517 with Luther's decisive challenge to the papacy, so it is to be reckoned as closing with the dissolution, in 1563, of the council of Trent, which definitively established the limits of Roman Catholicism. Luther was the champion of revolt against the doctrinal authority of Rome, and his distinction is that he was the first to head a revolt which succeeded. The seed which came to harvest in the 16th century had been sown in the 14th by John Wycliffe in England. After Wycliffe's death his doctrines were stringently suppressed in England, though the persistence of concealed Lollardy kept the soil in some degree of readiness for further developments. Moreover, the doctrines that were taught at Oxford found their way to the university of Prague, where with some modification they were adopted by John Hus (*q.v.*). There were other universities besides Prague where the teachings of Hus were germinating a hundred years after his death.

The revolution which Luther initiated followed varying lines of development in the various countries of Europe during the 46 years which we have called the epoch of the Reformation. By the end of that time Spain and Italy were secured for the papacy; England, Scotland, and Scandinavia were secured for Protestantism; in France it was still uncertain whether Catholics and Protestants would settle down to mutual toleration, the Huguenots being in a minority, but still far too strong to be easily crushed by force. The crowd of German states were severally recognized as Catholic or Protestant, according to the predilections of their rulers; even the ecclesiastical principalities were not all given to the Catholics.

But in the main and speaking roughly, Protestant states predominated in north Germany and Catholic in the south. In Poland,

Bohemia, and Hungary it was still uncertain which of the creeds would conquer in the end. The Protestant folk of the northern Netherlands were still under the yoke of Spain.

We may turn now to the narrative, beginning with Germany, where the gage of battle was definitely flung down.

In 1517 Pope Leo X, in want of money, proposed to procure supplies by the sale of indulgences on a scale and at a price hitherto without precedent. The sale of indulgences was not a new thing; it had before been made the subject of protest, but the scruples of princes had been quieted by a percentage of the profits.

But Luther had come very definitely to the conclusion that neither priests nor popes could grant pardons, the forgiveness of sins being the function of God alone. He posted on the church door at Wittenberg a series of theses denouncing the doctrine of indulgences, and the Elector of Saxony supported him by refusing permission to the commissioners for the sale of indulgences to enter Saxony. Luther now set about the hopeless task of fortifying his position so as to make his argument convincing to those who were certain not to be convinced; in so doing, he found himself proving to himself that reconciliation was impossible, and in effect prepared himself, not for the defence of a particular thesis, but for open war.

Position of the Protestants

At the diet of Worms he clearly proclaimed the Protestant position: that popes and councils may err, but the truth which he found in Scripture could not err, and by that he would stand at all costs. That declaration was in fact the assertion of his own right and his own duty to follow his own judgement and to obey his own conscience. If that was his right and his duty, it follows that it is no less the right and duty of every individual. The logical conclusion was universal toleration for all opinions conscientiously held, but Protestantism did not for generations to come rise to the fullness of that conception.

Germany was divided in opinion. Personal interests, contempt for the papacy, anti-clerical sentiment, admiration for Luther's courage, genuine moral and religious enthusiasm, all combined in varying degrees to bring together a body of support for Luther so powerful that any attempt to crush it would obviously have involved Germany in civil war, of which no one could have foretold the issue. The edict

issued against him by the diet became practically a dead letter. A diet held at Spire in 1526 agreed upon a compromise, which virtually left each of the princes to settle matters as he chose within his own dominion; when another diet there, 1529, cancelled the compromise and resuscitated the edict of Worms, the new edict was met by the Lutherans with a defiant protest which gave to them and to the cause of the Reformation the name of Protestant: and this was followed up by the issuing of the formal confession of faith in 1530, known as the Confession of Augsburg (*q.v.*). But this was not enough, and the princes who adopted the Augsburg Confession united themselves in the defensive armed league of Schmalkalden.

The Council of Trent

The predilections of Charles V (*q.v.*) were antagonistic to Protestantism as being subversive of authority in general, and a palpable obstacle to one of his great political aims, the establishment of the emperor's personal authority in the empire as supreme. But Charles could not afford to plunge into a doubtful civil war, and the years passed uneasily, with civil war perpetually threatening. The prevalent view, which everyone professed more or less ardently to support, was that the whole question ought to be dealt with and brought to a final settlement by a general council of the Church.

But unfortunately every party concerned wanted such a council to be held under conditions which would ensure that particular party's own predominance therein, and by no means under conditions which promised the predominance to someone else. Pending the summoning of a council, a conference was held at Ratisbon between representatives of the various religious parties, in 1541, but no basis of agreement was reached. At last, under pressure from the emperor, Pope Paul III summoned a council to be held at Trent in 1545, but the terms under which it assembled made it a foregone conclusion that its decisions would be wholly papalist; practically Protestants declined to recognize its oecumenical character. Its decisive activities were deferred till 1562.

Meanwhile in Germany the contest had reached a settlement on its political side, for Luther had done much to avert an armed conflict. Almost immediately after his death in 1546 Charles found an opportunity for attacking and crushing the league of Schmalkalden (*q.v.*). In 1547 his personal relations with the pope were

exceedingly strained; therefore he took matters into his own hands, and issued on his own authority the terms of a compromise known as the interim of Augsburg, which was satisfactory to no one. A reaction set in, and in 1552 the emperor without warning found himself almost deprived of authority, and was obliged to submit to the treaty of Passau, which in 1555 was confirmed by the pacification of Augsburg, intended to establish a permanent religious peace throughout Germany, having as its basis the principles that the religion in each state should be the religion of its prince, and that toleration should be granted to the Lutheran worship. For various reasons the settlement did not prove permanent, but it secured peace for more than 60 years.

Reformation in Switzerland

In Germany the struggle had practically been one between the adherents of the Lutheran confession and the adherents of the papal authority on questions of religion. But it had been bound up with a constitutional resistance to the emperor's political design for centralising the control of the empire by establishing his own supremacy. It had been further complicated by the traditional antagonism between pope and emperor as to the spheres of their respective authorities. Only latterly it was touched also by a non-Lutheran form of Protestantism which predominated outside of Germany. The fountain-head of this other form of Protestantism was in Switzerland. The Swiss school predominated in France, in the Netherlands, and in Scotland. In England the Reformation was a peculiar and distinctive compromise in which the dominating factors were political.

The Swiss reformation was set in motion by Zwingli, at Zürich. Zwingli, like Luther, successfully challenged the doctrine of indulgences and the attempt to sell them. Like Luther, he attacked abuses, and made the Scriptures the criterion of truth. But his interpretations of Scripture were not identical with those of Luther; on the question of the Eucharist the two held fundamentally divergent views. Luther, rejecting the Roman doctrine of transubstantiation, substituted for it the doctrine of consubstantiation, affirming the real presence, though in another form. Zwingli denied the real presence altogether, claiming that the Lord's Supper was purely commemorative. Zwingli was tolerant, willing to recognize as legitimate much wider diversi-

ties of opinion than Luther, who denounced him almost as energetically as he denounced the pope.

Reforming refugees from other countries sought asylum in Switzerland. Among these was John Calvin, who, in 1536, issued from Basel the Institutes, which at once laid down the doctrines of the Calvinistic theology, and the principles of the form of Church government known as Presbyterianism. Calvin, without accepting consubstantiation, admitted in his doctrine of the Eucharist a more mystical view than the frank rationalism of Zwingli. But he was still further removed than was Luther from the Zwinglian attitude of toleration; his creed was more rigid than that of either Zwingli or Luther, and more completely irreconcilable with mere modifications of Roman doctrines, or the Roman organization.

When Luther defied the papacy, Lutheran and Zwinglian doctrines at once began to make way in other countries, though the secular authorities were generally disposed to suppress them with more or less vigour. Jealousy of the clergy, however, was common among the nobility. In France the crown, after a brief hesitation, definitely took the side of orthodoxy against innovation. But many of the nobility followed the opposite course; they derived, moreover, a certain strength from the obvious fact that Francis, despite his title of the Most Christian king, was quite ready to ally himself with heretics, or even with infidels, if by doing so he could serve his own political purposes. Then Calvinism, originated by a Frenchman, appealed to the French mind. Calvinism lent itself to political organization, and the Huguenots, as the French reformers were called, became a very powerful body.

Growth of Political Parties

The adherents of the rival faiths assumed the character of political parties. The Catholics themselves were largely anti-papal in the days of the council of Trent, at least in the sense of claiming a great degree of national independence; and though Catholicism was definitely predominant, it by no means held a decisive mastery. For 35 years to come there was a continuous struggle, which was only brought to a conclusion when the legitimate Huguenot claimant of the crown purchased Catholic support by renouncing his Protestantism, but kept faith with his former co-religionists by issuing the edict of Nantes in 1598.

In Scotland the movement, which, as in France, drew its inspiration from Geneva, was vigorous among the commons. The crown, closely allied to the Church in its struggle with the nobles, encouraged persecution; the nobles, angrily hostile towards the churchmen, leaned strongly to the side of the Reformation, and finally won a complete victory with the aid of Queen Elizabeth in 1560. In the Northern Netherlands Calvinism took a firm grip in spite of the persecuting policy of Charles V and his successor, Philip II of Spain; but the great struggle of those provinces for religious liberty was still to come.

Henry VIII and England

In England, before the appearance of Luther in Germany, a reforming movement had already made great progress under the guidance of scholars and humanists, not without encouragement from leading ecclesiastics, all acutely conscious of the need of raising the moral and intellectual standards, both of clergy and laity. But the Lutheran propaganda, and the anarchist propaganda, by which, in spite of Luther's own denunciations, it was accompanied, made reactionaries of the reforming leaders themselves. There was among most of them no disposition to question the spiritual authority of the Church, or of the papacy, no thought of challenging received doctrines, though much demand for the abolition of obviously corrupt customs. But circumstances developed in the mind of Henry VIII a determination to repudiate the authority of the papacy, because he found that it stood in the way of his personal desires. Since the pope was not to be persuaded to annul his marriage with Catherine of Aragon, the pope was to be penalised by the unqualified refusal to recognize in England any papal authority whatever, and by the cutting off of all English contributions to the papal coffers.

The English clergy were not disinclined to claim national independence of the Roman episcopate. Having failed to take their stand on the side of ecclesiastical against secular authority, they found themselves powerless to resist the king when he went on to assert his own personal supremacy as head of the Church in England, or when he proceeded, with the assent of parliament, to enormous confiscations of ecclesiastical property, and the complete suppression of monastic establishments. In all this the king had the support of every anti-clerical element in the

country; and since not a few of his most useful instruments were men with leanings towards Lutheran or Zwinglian doctrines, and the friendship of German Lutherans was for political reasons desirable, the king, without admitting such doctrines, was willing to suffer some small latitude of opinion, but nothing more.

During the brief reign of Edward VI, the government gave free play to the reformers; by vigorous ecclesiastical legislation it imposed religious formulas, Protestant in character, and definitely ranged itself upon the side of Protestantism; though the dominating influences gave the formulas an extremely comprehensive character, sufficiently indefinite to cover very wide diversities of opinion. In the next reign Mary endeavoured to recall the country to its old allegiance to Rome. She defeated her own ends by resorting to the fatal method of persecution. The legitimacy of her half-sister and successor Elizabeth could be maintained only on the hypothesis that the papal pronouncement on the so-called divorce of Catherine of Aragon was invalid. Elizabeth therefore was compelled to repudiate the papal authority, and it had already become clear that such repudiation was incompatible with the retention by the Church of those Roman tenets which the various Protestant schools had agreed in rejecting. The popular hostility to Rome, confirmed and greatly extended by the Marian persecution, weighed in the same scale; and with the accession of Elizabeth England was definitely ranged on the Protestant side.

Bibliography. History of the Papacy during the Period of the Reformation, M. Creighton, 1882-94; History of the Popes from the Close of the Middle Ages, 12 vols., L. v. Pastor, Eng. trans. 1891-1912; The Era of the Protestant Revolution, F. Seebohm, new ed. 1894; Dawn of the Reformation, H. B. Workman, 1901-02; Cambridge Modern History, vol. II, 1904; History of the Reformation, T. M. Lindsay, 2nd ed. 1907-08; Economic Causes of the Reformation in England, O. A. Marti, 1930; Characters of the Reformation, H. Belloc, 1936; The English Protestant Tradition, E. G. Rupp, 1947.

Reformatory. Former name of schools for the reform of young delinquents aged 14 years and upwards, and for the reception and training of others who seemed likely on account of their circumstances to become delinquents. Reformatories for children under 14 were called industrial schools.

Reformatories and industrial schools were instituted by philanthropic individuals and societies with the dual object of preventing "hordes of unruly children" from becoming a danger to the community, and of fitting them for industry by controlling them strictly in institutions and training them to earn their own living. The Philanthropic society in 1788 established a school in London for the children of convicts; John Pounds opened the first ragged school in 1818. Rich people started small feeding schools in the large cities; then opened ragged schools in which the children could be housed and cared for and trained; and bought land and built industrial schools for the younger children and reformatories for the older children who had been convicted of crime and would otherwise have been sent to prison. The institution set up by the Philanthropic society at Redhill in 1839 to replace its London school became the pattern for many others.

In 1854 the Reformatory Schools Act was passed, and was followed by the Industrial Schools Act in 1857. These Acts authorised government grants to such schools and made the home secretary responsible for their inspection. In 1858 there were 45 reformatories in England and Scotland containing 1,973 boys and 370 girls—only about 200 of them detained by magistrates' orders. In 1914 there were 223 schools with 25,000 children.

The Children Act of 1908 clarified the law for the protection of children. A children's branch of the home office was established. One of its reports, 1927, led to the Children and Young Persons Act of 1933, by which industrial schools and reformatories were renamed approved schools, *i.e.* approved by the home secretary for the reception and training of children (those who appear to be less than 14 years of age) and young persons (those who appear to be 14 to 17). Boys' approved schools are classified into junior, intermediate, and senior, and girls' schools into junior and senior. The schools vary according to religious denomination, size, character of buildings, vocational bias, etc. The time required for completion of training varies according to the needs of the pupil, and a court does not specify any period of detention. But a child may not be detained longer than 3 years, or 4 months after school leaving age; a young person under 16 for more

than 3 years; and a young person over 16 after his 19th birthday. At certain short-term schools 9-12 months training is given. In 1950 there were in England and Wales 92 boys' approved schools (with 7,834 pupils) and 43 girls' schools (with 1,386). *Consult* Making Citizens, M. M. Simmons, 1948.

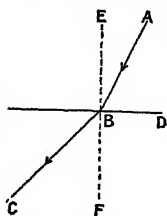
Reform Club. London club. It was founded in 1836, and was long the chief club of the Liberal party. The house, 104, Pall Mall, was built by Sir Charles Barry. As a political centre it was superseded by the National Liberal Club (*q.v.*), but it remained a meeting place especially for lawyers, economists, and journalists. The Manchester Reform Club, founded in 1866, was an important centre of Liberalism in the north of England.

Reformed Churches. Term used generally for all Protestant bodies which have separated from the Church of Rome and adopted the principles of the Reformation. It is more definitely applied to denominations in Germany and elsewhere, which separated from the Lutherans and followed the teaching and church organization of Calvin and Zwingli. They are strongly predestinarian in doctrine, reject Luther's theory of consubstantiation in the Eucharist, are presbyterian in church government, and adopt a simple and extemporaneous form of public worship. In Germany they are often called Evangelical Churches.

Reformed Episcopal Church. Small Protestant denomination, originating in a secession from the Episcopal Church of America. It originated in 1873, when Bishop Cummins and seven other clergymen left the American Church on the ground that it was not sufficiently Protestant to meet their views. They objected to the doctrines of the real presence, baptismal regeneration, the eucharistic sacrifice, the power of the priesthood, and the necessity for episcopal ordination. Cummins consecrated other bishops, and a few local churches were started. The movement found some adherents in England, where it is called the Free Church of England with some 50 places of worship.

Refraction. In optics, a phenomenon caused when waves of light or other types of wave-motion pass from one medium into another medium. Usually when light waves traverse two media, the waves have their directions changed or refracted. The phenomenon is of importance in atmos-

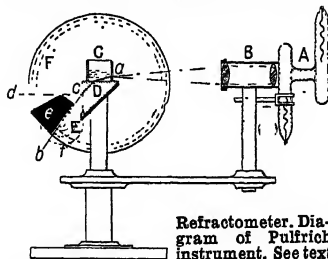
pheric optics, for it is due to refraction that mirages, haloes, and rainbows occur, that the day appears longer than it is, etc. When the stratification of air is such that there are rapid changes of density with height, the sun may appear distorted and can even vanish without apparently reaching the horizon. A



Refraction. Diagram showing the law of refraction. See text

common example of the effect of refraction is seen when a walking-stick is partly submerged in water. The stick appears to be broken at the surface of the water, due to the different indices of refraction of air and water. In the figure, A B is a ray of light refracted at B along the line B C. B D is the plane between the two media, and E B F the perpendicular at that plane. By the laws of refraction the refracted ray makes with the normal an angle whose trigonometrical sine bears a constant ratio, for any two particular media, to the sine of the angle the incident ray makes with the normal. When light is refracted from one medium to another, the ratio of the sines of the angles of incidence and refraction is known as the refractive index. Certain crystals are remarkable for their power of giving two refracted rays, i.e. double refraction. See Crystallography; Light; Optics.

Refractometer. Instrument which assumes various forms for



Refractometer. Diagram of Pulfrich instrument. See text

determining the refractive index of solids, liquids, or gases.

In a Pulfrich refractometer for determining the refractive index of liquids, of which only a small quantity is available, the principle of total reflection is used. The figure shows diagrammatically the principle of such a refractometer. A is a Geissler tube and the source of light, concentrated by lenses in B on to a glass cylinder C, which

contains a liquid whose refractive index is being tested. D is a prism, a and b refracted ray, $b c d$ angle read by telescope E, mounted on a graduated circular scale F; e is a shadow area to left of ray, f bright area to right. Calculation of angle $b c d$ gives refractive index. In an interference refractometer, the index is determined by the use of interference fringes, and so allows of the measurement of the difference of path of two interfering rays. The instrument may be used in various forms to measure very minute linear distances where great accuracy is required. One such is the Rayleigh refractometer for measuring the small refractive indices of gases. To increase its accuracy the tubes containing the gases are 12-18 ins. long.

Refractory Material. Term meaning any material which is stubborn or difficult to work or treat. Certain metals, e.g. tungsten, molybdenum, zirconium, iridium, are termed refractory, because they are extremely difficult to work or fabricate even at very high temps. Processes have, however, been devised for making these metals into crucibles, tools, etc., where their very refractoriness is of value. In metallurgy, a refractory material is one which will withstand the very high temps. and hard conditions in a furnace; such refractories are used to make bricks for furnace and kiln linings, crucibles, flues, chequer-work for regenerators, etc. They must withstand not only high temps., but also the action of slags, high pressures, and weights, erosion by hard particles, corrosion by gases and liquids, oxidising and reducing conditions, penetration by gases or liquids, and rapid changes of temp. No one material will withstand all possible conditions, and the best possible must therefore be sought in dealing with each problem.

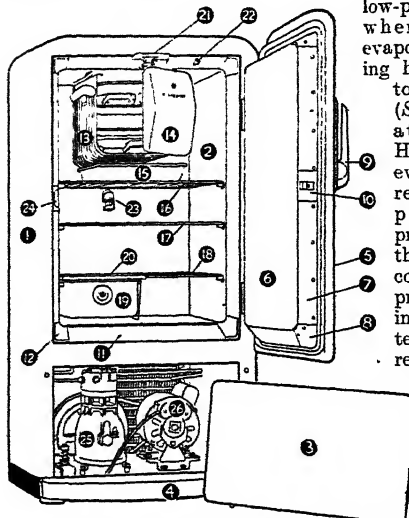
The materials most commonly used are natural earths, clays, and sands; various synthetic materials are, however, available. Refractories are acid, neutral, or basic. The chief acid materials are silica, and others of which silica is the principal constituent. They will combine with the metallic oxides to form silicates, the principal members of the group being quartz, quartzite, ganister, Dinas rock, sandstone, and flint. Dinas rock contains more than 90 p.c. of silica, the remainder being small amounts of alumina, lime, iron oxide, and alkalis; ganister may have as little as 92 p.c. silica. When silica is heated,

changes take place in its crystal structure, s.g., and vol., quartz being transformed into cristobalite and then into tridymite, with a linear expansion of more than 5 p.c. These factors must be taken into account in making Dinas or silica bricks, and when they are in use, the furnace must be heated slowly so that changes in them can take place without cracking or "spalling" the bricks.

Fireclay, which lies between the acid and neutral groups, contains 50 to 70 p.c. of silica, with 20 to 35 p.c. of alumina. The fireclays owe their plasticity to the presence of appreciable amounts of combined water; their refractoriness is adversely affected by the presence of alkalis. They are found associated with many of the coal measures in the U.K. and are widely used for the manufacture of firebricks used for all furnaces not requiring special refractories, as well as for blast furnaces, reverberatory furnaces, coke ovens, heat regenerators, flue stacks, etc.

Among the true neutral refractories are graphite or plumbago, silicon carbide, bone ash, and the most important crucible material, chromite, which is too expensive to be used except in special parts of certain furnaces. The basic refractories, which contain little or no silica, are very resistant to the attack of metallic oxides. The commonest are magnesite, lime, dolomite, alumina, and bauxite; thorium and zirconia have limited application. Lime is rarely used except in melting the platinum metals as it combines with water too readily. Dolomite is used in the steel industry for the linings of basic open hearth furnaces and converters. Natural magnesite contains more than 90 p.c. of magnesium carbonate, which is converted to magnesia when the bricks are burnt. It is used in the ferrous and non-ferrous industries for, e.g., the suspended roofs of copper reverberatory furnaces. Bauxite has rather limited use because it shrinks a great deal at high temperatures.

In making all refractory bricks, a proportion of crushed old bricks, termed "grog," is used, but nevertheless the consumption of refractories is one of the chief economic burdens of the metallurgical plant, every furnace usually containing several sorts of brick. As it is important to know the temps. at which refractories will soften during use, a series of standard compounds of various oxides has been made, called Seger Cones.



Refrigeration. Fig. 2. A domestic refrigerator
1. Cabinet outer shell. 2. Food compartment inner. 3. Apron. 4. Lower cabinet front. 5. Door outer panel. 6. Door inner panel. 7. Door breaker strip and gasket. 8. Door latch. 9. Door opening moulding. 10. Door opening corner plate. 11. Evaporator. 12. Evaporator door. 13. Drip-tray. 14. Top shelf. 15. Middle shelf. 16. Lower half-shelf. 17. Moist cold compartment and cover. 18. Thermostat. 19. Interior light switch. 20. Interior light. 21. Door latch plate. 22. Compressor. 23. Electric motor.

Figs. 2 and 3 by courtesy of Frigidaire

The refractory sample is tested by heating it in a furnace with a series of these cones, when it will be seen to soften at the same temp. as one of them, and is then said to soften at a particular cone. See Alumina; Firebrick; Grog; Metallurgy; Plumbago; Silica.

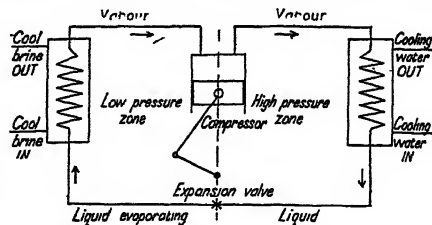
Refrigeration. Action of cooling, more particularly process of securing by artificial means a temp. lower than the surrounding temp. It is widely used for cold storage, ice and ice-cream making, and air-conditioning. In principle refrigerating plants are reversed heat-engines, and energy is thus required to absorb heat at a low temp., ejecting it to higher temp. surroundings.

The system now predominant, the vapour-compression type, consists essentially of compressor, condenser, and evaporator, together with an expansion valve. The medium or refrigerant is a gas easily liquefied under moderate pressures. Figure 1 shows the principle upon which the system works, the vapour being compressed until it can be liquefied by cooling water and then passing through the expansion valve to the

low-pressure zone, where the liquid evaporates, absorbing heat equivalent to its latent heat. (See Evaporation; Latent Heat.) From the evaporator the refrigerant vapour is compressed again, and the circuit thus completed, the process proceeding continuously. The material to be cooled may be refrigerated directly by the evaporation of the refrigerant in a direct-expansion system, e.g. the air inside a domestic refrigerator. Alternatively, as shown, brine may be cooled in an indirect system, and the cooler brine circulated where desired.

Various materials are employed as refrigerants. Ammonia is usual for large-scale plants, and refrigerator ships employ carbon dioxide. Smaller plants and domestic refrigerators employ sulphur dioxide and various halogenated hydrocarbons. The ca-

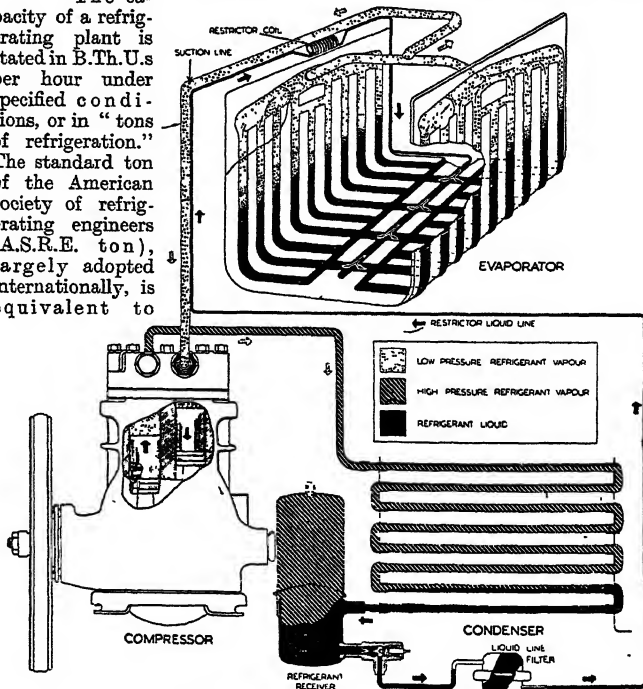
pacity of a refrigerating plant is stated in B.Th.U.s per hour under specified conditions, or in "tons of refrigeration." The standard ton of the American society of refrigerating engineers (A.S.R.E. ton), largely adopted internationally, is equivalent to



Refrigeration. Fig. 1. Diagram illustrating principles of vapour-compression cycle. Broken line denotes separation of "High Pressure" and "Low Pressure" zones

melting one U.S. ton of ice per day; i.e. 288,000 B.Th.U.s per day. Insulation of spaces refrigerated is necessary; cork is satisfactory for this.

Large plants are usually electrically driven, but automatic regulation of expansion valves and automatic safety devices are common. Since about 1930 there has been considerable advance in design, application, and popularity of fully automatic refrigerators of all sizes. They incorporate automatic devices controlling temp., refrigerant flow, and compressor operation; smaller machines dispense with water consumption by adopting air-cooled condensers. Mechanisms, including fans for condensers, are electrically driven, and are designed for many years'



Refrigeration. Fig. 3. The mechanism of a domestic refrigerator

operation with negligible skilled attention. Figures 2 and 3 show a typical domestic refrigerator and its mechanism. The restrictor liquid line replaces the expansion valve, but otherwise the components are identical with those in Fig. 1. Cabinet sizes are quoted in net storage capacity, 3 to 6 cu. ft. being popular.

Hermetically sealed compressors often replace belt-driven types. Here, both motor and compressor are enclosed within the refrigerant space, thus simplifying the mechanism and reducing the possibility of refrigerant leakage. Refrigerators operating on the absorption system eliminate compressors, by generation of ammonia from solution and subsequent re-absorption. Domestic refrigerators using the absorption system, with electric, gas, or paraffin heating, contain no moving parts, and are popular for this reason.

Refugee. Term applied to one who, for political or other reasons not criminal, is obliged to fly from his country of origin and take refuge elsewhere. Religious persecutions in the 17th century sent many refugees to England, and the country greatly benefited by the arts and crafts they introduced, e.g. the weaving and silk manufactures brought by the Protestant refugees from France after the revocation of the edict of Nantes, 1685. Political refugees in the 18th, 19th, and 20th centuries also, many of them, brought new industries and industrial processes, and included a number of distinguished scientists, doctors, writers, and musicians. Refugees from fascist Italy took refuge, for the most part, in France; those from Nazi Germany in the U.K. and the British Commonwealth, the U.S.A., and Latin America. The universities of Constantinople and Jerusalem gained especially from the presence in them of notable men of learning sent into exile by Nazi persecution. There were settled in the U.K. in 1939 some 80,000 refugees from Germany, Austria, and Czecho-Slovakia.

During the First Great War, a number of Belgian refugees from German occupation of their country made their way to England, where they were cared for until Belgium was free again. During the Second, refugees fled before the rapid German advance in 1940 from Belgium into France, from N. France to S. France, their blocking of the roads greatly hampering movement of Allied troops and supplies, and

their presence in unoccupied France proving a problem to the Vichy govt.

As the Allies advanced into Germany in 1945, millions of Germans fled from W. and E. to the centre of their country; in 1949 refugees and expelled persons in W. Germany from Polish- and Russian-occupied Germany, central Europe, and the Balkans totalled more than 9,000,000, constituting ten p.c. of the pop. in N. Rhine-Westphalia, 30 p.c. in Lower Saxony, 45 p.c. in Schleswig-Holstein. *See Displaced Person.*

A million Arabs fled from their homes to Arab Palestine and neighbouring countries after Israel was proclaimed in 1947; in June, 1950, 940,000 were receiving U.N. relief.

Refugee Organization, INTERNATIONAL. U.N. body set up, 1947, to care for displaced persons *See Displaced Person.*

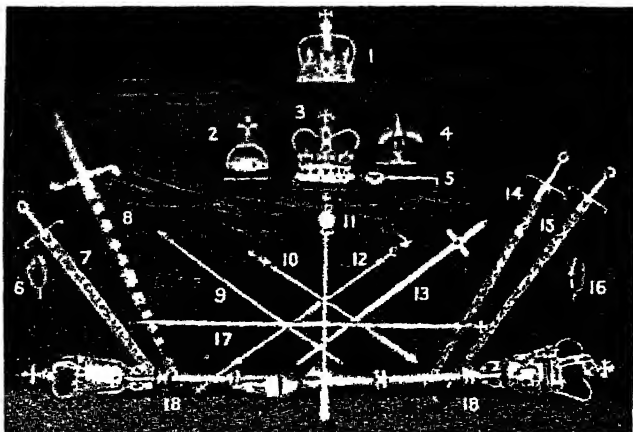
Refuse. Literally, that which is rejected or worthless. The word refers especially to waste from factories and houses, the suitable disposal of which is essential to health. Three general methods have been used: (1) dumping on land and partly burning in the open; (2) dumping at sea; and (3) destruction in special furnaces. The first two are impracticable in any large community, the third is cleanly and comparatively inexpensive. *See Destructor; Salvage*

Regal. Small portable organ, dating from about 1460, and having one or more stops of beating-reeds. The origin of the name is uncertain, but it is probably derived from Lat. *regula*, rule, as the in-

strument was originally used to regulate or keep in order the singing of the monks. It was sometimes made to fold up, with an exterior resembling a book, hence the term Bible Regal. Amongst the instruments possessed by Henry VIII were several pairs of double (or full compass) regals, and of single (or short compass) regals. *See Organ.*

Regalia (Lat. *regalis*, royal). Emblems belonging to the sovereign as such. The regalia of the sovereign of Great Britain include S. Edward's crown, the imperial crown, S. Edward's staff and sceptre, the royal orb, a pair of bracelets or armillae, a ring, a mantle and other garments, a pair of spurs, the ampulla or golden eagle—a receptacle for the anointing oil—and a spoon for the oil. Others are the five swords, two of state, one of temporal justice, one of spiritual justice, and the curtana. There are also crowns and staves for the queen consort. All are used at a coronation. They are kept in the Tower of London, and most of them were made for the coronation of Charles II. The regalia of Scotland, crown, sword, and sceptre, are kept in Edinburgh Castle. The word is also used for certain rights belonging to the sovereign as lord of the land, these being relics of feudal times. *See Coronation; Crown, colour plate; Feudalism; Tower of London; consult also The English Regalia, C. J. H. Davenport, 1897.*

Regan. Character in Shakespeare's *King Lear*. One of the two elder daughters of the king.



Regalia of the British Sovereign. 1. Imperial Crown. 2. Orb. 3. S. Edward's Crown. 4. Ampulla. 5. Anointing spoon. 6. Spur. 7. Curtana. 8. Sword of state. 9. Queen's sceptre, with dove. 10. Queen consort's sceptre. 11. Imperial sceptre, with cross. 12. King's sceptre, with dove. 13. Sword of offering. 14. Sword of temporal justice. 15. Sword of spiritual justice. 16. Spur. 17. S. Edward's staff. 18. Maces

Copyright of H.M. The King

and the wife of the duke of Cornwall, she joins her sister Goneril in unfilial conduct to their father, and encourages her husband to put out the eyes of the king's faithful servant, the earl of Gloucester, with whose illegitimate son, Edmund, she falls in love. In the end she dies poisoned by Goneril, her rival for Edmund's love. *See King Lear.*

Regardant (Fr. *regarder*, gaze). In heraldry, looking backward or with intent gaze. *See Heraldry.*

Regatta (old Ital., contention). Sporting fixture on the water, consisting of races between single skiffs, rowing boats, or sailing yachts. The term was introduced from Venice, where it was applied to an annual boat race, in 1775, in which year the first English regatta was held on the Thames. The premier river regatta takes place in July at Henley-on-Thames, and Cowes at regatta time in Aug. is the Mecca of the yachting world. During the summer other regattas of varying importance are held on rivers or round the coast. At the smaller regattas the programme is not confined to "best boats," and may include aquatic sports.

Regelation. Term first used by Faraday for a phenomenon of freezing. When pursuing his investigations in heat at the Royal Institution in 1850 Faraday observed that, if two pieces of ice be pressed firmly together and then the pressure is removed, the pieces will unite into a solid block. What happened was that where the blocks were in contact the melting point of the ice was lowered because the pressure caused slight melting to occur; as soon as this pressure was released the freezing point of the water rose, the resulting freezing uniting the pieces. That ice will melt under simple pressure has since been frequently proved, and serves to explain many common phenomena.

Every schoolboy, in countries where snow occurs, knows that it is sometimes easier to make a snowball than at others. If the snow be very cold and dry it is not easy to make a firm ball, because the pressure of the hands is not sufficient to make the snow melt, which it must do before it can be formed into a ball. But if the temperature be somewhere near the freezing point, such pressure as can be given by the hands will suffice to melt the particles of snow where they are squeezed together, thus forming a little water which, as soon as the pressure is released, freezes and binds the snow into a ball. In skating, the pressure under

the edge of a skate is very great. The skater therefore glides about on a narrow film of water which forms continuously at the surface of contact with the ice, freezing again when relieved of pressure. On very cold ice it is difficult to obtain a "bite," and hollow-ground skates will have the advantage over the type in which the bearing area is larger and the exerted pressure hence less.

A demonstration of regelation is to take a block of ice and pass over it a loop of wire attaching a weight below to the wire. The wire will cut its way through the block, but as fast as it does so the block will freeze solid again. Regelation also largely explains the formation of glaciers which begin as snow. *See Glacier.*

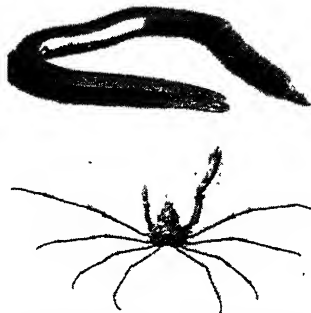
Regency. In British history the term used in particular for the period 1811-20, when the prince of Wales (afterwards George IV) ruled the country as prince regent, his father George III being incapacitated through mental disorder. The period gave its name to a style of architecture and applied decoration. Deriving in part from the French Directoire, and a modified form of Palladian, it flourished both before and after the regency, roughly 1800-37. Nash's Regent St., London, with its Quadrant, exemplified Regency architecture at its best; other examples include his Regent's Park terraces of stuccoed mansions with pseudo-Greek decorations, balconies, and bow windows. There are fine examples of Regency architecture at Brighton and Hove, Bath, and Cheltenham. In France the term applies to a transitional style between the classic splendour of the Louis XIV period and the fantastic rococo of Louis XV's reign.

Regeneration (rebirth). Name given to the divine act or process by which the life and character of a man are changed when he becomes a Christian. Regeneration is the correlative of conversion. Conversion represents the human side, i.e. what the man himself does through repentance and contrition; regeneration represents the divine side, i.e. what God does for the man by the gift of grace and the Holy Spirit to make the conversion effective. Many attempts have been made to define and explain the process exactly.

A number of theologians have maintained that regeneration confers upon man a new spiritual faculty, hitherto unpossessed, which enables him to grasp and assimilate Divine truth. Others hold

that it wakes into life a religious consciousness which has hitherto been dormant. Others again say that it alters the balance of forces in a man's life and enables the higher and more spiritual side of his nature to obtain the mastery over the lower and more carnal. Something analogous to the Christian conception of regeneration is found in other faiths. The doctrine of the "twice-born man" plays a great part in the religions of India. In the Greek mystery religions the conception of regeneration is of great importance. The Hermetic literature declares that "regeneration is the end of all revelation." *See Incarnation.*

Regeneration. The power of reproducing by new growth parts of the body that have been lost by accident or amputation. It is observable chiefly in the lower orders of animals, in which there is greater liability to loss from the attacks of enemies. Trembley's celebrated experiments with the fresh-water hydra nearly 200 years ago demonstrated that, if a hydra is cut across, the basal portion reproduces the lost mouth and tentacles, and the upper half reproduces a new base. If divided vertically, the left side produced a new right half, and the original right a new left. Sponges and sea-anemones have a similar power of repair, and the common starfish frequently affords evidence of having lost one or more of its rays, which it has reproduced on a smaller scale. The brittle-stars are so called on account of their readiness to part with their rays on the



Regeneration. Spider crab, with left pincer leg being reproduced after loss. Top, slow-worm reproducing lost tail, seen on extreme right

slightest alarm, the lost members being reproduced with facility.

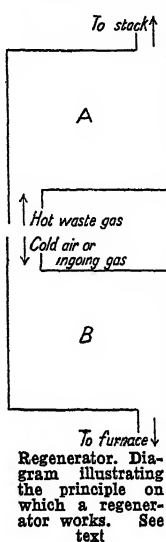
In insects this power is not commonly exhibited, but the stick-insects, which are very liable to lose their long legs, reproduce them when they moult; at first they are

bud-like, but with each successive ecdysis the new limb becomes larger. In this they follow a similar course to the higher crustacea, which frequently lose limbs—often voluntarily, as a means of escape from danger—and gradually replace them when they moult. Regeneration is equally common among molluscs, especially the sea-snails (gastropods), which, when active, are only partly protected by the shell, and the head or hinder part of the foot may be bitten off by fish. The mollusc is able to renew the lost parts. Injuries to the shell are repaired by the mantle which secreted it.

Among vertebrates the phenomenon is much less common, but fishes have been known to reproduce lost fins, and the batrachians limbs and tails. Spallanzani barbarously amputated all the legs and the tail of a salamander no fewer than six times, and they were reproduced each time. Bonnet repeating the experiment succeeded eight times with one salamander. The slow-worm, the gecko, and the common lizard readily part with their tails if these are held, and the stump develops a new tail, but it is several years before the new part equals that which has been lost.

There is something of the same nature in plants. A spruce whose leading shoot has been destroyed will replace it by the upward growth of a bud that was intended to develop into a lateral branch. When a limb has been broken off a large tree by a gale the bark will grow over and protect the wounded part, which may later continue its growth from resting buds. A cutting of a plant will seek to restore its lost base by throwing out roots. See Biology; Botany; Insect.

Regenerator OR **REGENERATIVE FURNACE.** Metallurgical apparatus. When Siemens invented the open hearth for making steel, he found it impossible to reach the necessary high temperatures without preheating the gas and air going into the furnace. A similar conclusion had been reached by Neilson in 1828 in regard to the blast furnace, and he increased efficiency by preheating the blast. There are two systems of preheating gases and air; both use the heat that remains in waste gases after they leave the furnace. The two types of plant are called recuperators and regenerators. In recuperators the heat exchange is carried on continuously, the waste gases and the ingoing gas or air being separated.



Regenerator. Diagram illustrating the principle on which a regenerator works. See text

gases are heating the chequer work in chamber A, the hot brickwork in chamber B is heating the cold ingoing air or gas. After a certain period the valves are switched, so that A and B are reversed. Regenerators are commonly used for steel furnaces; recuperators more often in the gas industry.

Regensburg. City of Germany.

The capital of Lower Bavaria, it stands at the confluence of the Regen with the Danube, 65 m. N.N.E. of Munich. The French call it Ratisbon, and this name commonly occurs in English history books. It is one of the oldest and most interesting surviving German cities. A Celtic settlement, Radaspona, 500 B.C., it became the Roman Castra Regina in A.D. 179, residence of a Bavarian dynasty c. 500, of the emperor Louis the German 826, a free city 1245, and from the 16th century was the seat of German diets until 1806. This glorious past is reflected in buildings, which largely survived

Recuperators are usually made of some sort of refractory material, but may be of metal.

Regenerators work on a discontinuous cycle, each of two chambers being heated in turn by the waste gases to a high temperature and then giving its sensible heat to the cold air or ingoing gas during the next half of the cycle. In the diagram, while waste

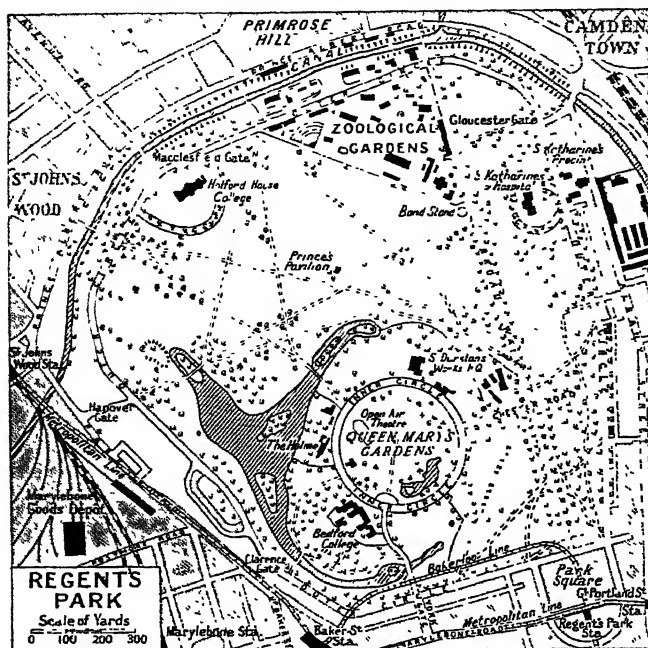
the Second Great War: the cathedral of S. Peter, an early Gothic pile (1275-1524), with twin towers 330 ft. high; an abbey with Roman basilica (12th century), S. Ulrich's church (1240), S. Cassian's (15th century), the Benedictine monastery of S. Emmeran with a Roman church (8th-12th centuries) where several emperors are buried. Secular buildings are the old town hall (13th-14th centuries), the palace of Thurn and Taxis princes (with precious library), the courts of the Bavarian dukes and of the bishops, a stone bridge (1135-46), and old houses and castles, among which is the famous Golden Tower with its ten floors.

Modern Regensburg, from 1810 incorporated with Bavaria, after having been held by Napoleon, became an industrial and transport centre, with river port on the Ludwig Canal, shipyards, breweries, and sugar, tobacco, printing, oil refining, wood, and stone industries. There are a R.C. academy for theologians and teachers, many other educational institutions, a theatre, museums, observatory, archives, libraries, and race-course. Pop. (1950) 120,000.

The object of a number of attacks by Allied bombers during the Second Great War on account of



Regensburg, Germany. The early Gothic style cathedral of S. Peter, with its 330 ft. high spires



Regent's Park. Plan of this London park, opened to the public in 1838
Based upon the Ordnance Survey Map with the sanction of the Controller of
H.M. Stationery Office

the presence in or near the city of two Messerschmitt plants, a jet-plane factory, and an oil refinery, Regensburg was captured April 27, 1945, by units of the U.S. 3rd army. After the surrender of Germany it lay within the U.S. zone of occupation.

Regent (Lat. *regere*, to rule). One who rules temporarily for a sovereign. The first regent of England was William Marshal, earl of Pembroke, at the accession in 1216 of the boy Henry III. The most famous regent of Scotland was James Stuart, earl of Murray or Moray, appointed after the abdication of Mary Queen of Scots, 1567. When George III was declared incapable of ruling, the prince of Wales became prince regent, 1811. Regents of the 20th cent. were Prince Paul of Yugoslavia, whose brother King Alexander, murdered in 1934, left a young son Peter; and Prince Charles, regent of Belgium in the absence of Leopold III from 1944. Hungary, historically a kingdom, had no monarch after the First Great War, but Admiral Horthy called himself regent, 1920-44.

The first permanent provision for a regent in Great Britain was made by the Regency Act, 1937. At the accession of King George VI, the heir presumptive to the throne was Princess Elizabeth,

then aged ten. This Act provided that if the sovereign was under 18, or at any time totally incapacitated by infirmity of mind or body, or for some definite cause not available, then the functions of the sovereign should be carried out by a regent. The incapacity of the sovereign must be declared in writing by the wife (or husband) of the sovereign, the lord chancellor, speaker of the house of commons, lord chief justice, and master of the rolls, or any three of these. The regent is the person next in succession to the throne, unless he is not a British subject of full age domiciled in the U.K.,

or is a Roman Catholic or married to one. A regent has no power to change the succession or alter the Protestant religion as established in Scotland. This Act of 1937, as amended by the Regency Act, 1943, also makes provision for counsellors of state (*q.v.*) to perform the functions of a

sovereign abroad or temporarily incapacitated.

Regent's Canal. London canal. It was constructed in 1812-20 by Nash, and named after the prince regent, afterwards George IV. The E. end is N. of the Thames, opposite the Surrey Commercial Docks; it crosses the Zoological Gardens in the N. of Regent's Park, and joins in Paddington the Grand Union Canal with which it was amalgamated in 1928.

Regent's Park. London park. Covering 472 acres in the bor. of Marylebone, it lies between St. John's Wood and Camden Town. It contains the gardens of the Zoological Society (the London zoo); that of the Toxophilite Society; and, within the Inner Circle, Queen Mary's garden, renowned for roses, and the open-air theatre. There is an artificial boating lake of 22 acres, and the Regent's Canal skirts the N. side. On the W. side is Regent's Park College; to the S. is Bedford College for women (*q.v.*). S. Katharine's Royal Collegiate Hospital, removed to the E. side from its site near the Tower, 1825-29, became redundant, 1948, and its chapel was leased to the Danish community in London.

Deriving its name from the prince regent, afterwards George IV, and once part of the ancient manor of Tyburn, Regent's Park, which is crown property, was laid out in 1812 by James Morgan, designed by John Nash, and was opened to the public in 1838.

Regent Street. London thoroughfare. It runs from Waterloo Place, Pall Mall (being Lower Regent Street as far as Piccadilly Circus), and passing Oxford Circus, finishes at Langham Place. One of London's great shopping centres, it was made in 1813-20 from designs by John Nash to connect



Regent Street, London. This famous thoroughfare and shopping centre, looking towards Piccadilly Circus

Carlton House (*q.v.*) with Regent's Park and the house which was to be built there or on Primrose Hill for the prince regent. Near the N. end is the Polytechnic. In the 1920s, as the leases which were crown property fell in, much of the street was rebuilt, to be reopened by George V in 1927. Many lovers of architecture have regretted the disappearance of the old colonnade and the curving line of Nash's buildings. Little permanent damage was done in the Second Great War, although one German bomb fell in the highway. See Nash. John; Piccadilly Circus.

Reger, Max (1873-1916). German composer. Born at Brand, Bavaria, March 19, 1873, he studied under Riemann, met opposition from German critics on account of his determination to be "progressive," but found a public for his first orchestral work, a *sinfonietta*, 1906. He became a teacher of composition at Munich, musical director at Leipzig, director of the court orchestra at Meiningen, and he died at Leipzig from a heart attack, May 11, 1916. A prolific composer in the Brahms tradition, Reger's organ fantasies and fugues are more important than his violin and piano concertos. It was said that he achieved for the organ the development which orchestral music had undergone in the 19th century. Orchestral works include a symphonic prelude to a tragedy, romantic suite, and variations on a theme by Mozart. He also wrote chamber music, songs, and piano pieces.

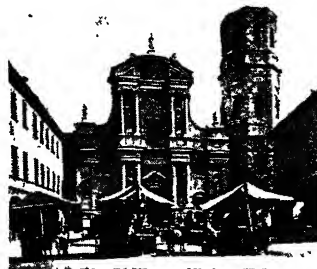
Reggio di Calabria. Southernmost prov. of the Italian mainland, in Calabria. It is almost surrounded by the Mediterranean Sea, and has an area of 1,219 sq. m. A promontory with a central ridge, a spur of the Apennines, it rises in Aspromonte (*q.v.*) to nearly 9,000 ft. The region is subject to seismic disturbances, but is on the whole fertile, producing chestnuts, oil, wine, silk. Coal is mined. Scilla, held by the British, 1806-08, is famous in the legend of Scylla and Charybdis (*q.v.*).

Reggio di Calabria. City of Italy, capital of the prov. of Reggio di Calabria. The ancient *Regium Julium*, it stands on the strait of Messina, 8 m. S.E. of the city of Messina and 248 m. by rly. S.S.E. of Naples. Always subject to earthquakes, it has several times been destroyed, notably in 91 B.C., on Feb. 4, 1783, and on Dec. 28, 1908, when the shock was followed by a tidal wave and 30,000 people

perished. Every building suffered damage, and those left standing had to be demolished. There is a trade in perfumes, silk, terra-cotta, oil, dried fruits, etc. Reggio was founded by Greeks about 720 B.C., and became a Roman colony in the 3rd century B.C. In the Second Great War Reggio was a base for German and Italian air forces operating over the Sicilian and Mediterranean narrows, and was frequently attacked by Allied bombers. On Sept. 3, 1943, British and Canadian elements of the 8th army went ashore at Reggio in the initial landings of the Allied invasion of Italy. Pop. 136,586.

Reggio nell' Emilia. Prov. of N. Italy, in Emilia. It slopes from the Tuscan Apennines to the Po valley, and has an area of 885 sq. m. Mountainous in the S., its culminating point is Mt. Cusna, alt. 6,420 ft. It is otherwise a fertile plain producing rice, wheat, vines, fruit, olives, and chestnuts. There are copper, iron, and sulphur mines. The chief manufactures include porcelain, glass, and silk.

Reggio nell' Emilia. Walled city of Italy, capital of the



Reggio nell' Emilia, Italy. The basilica of San Prospero, and market place

province of the same name. The ancient *Regium Lepidi*, it stands on a small affluent of the Po, 38 m. by rly. N.W. of Bologna. A fine city, with broad, arcaded streets, it has a cathedral founded in the 12th century and rebuilt in the 15th and 16th centuries. The church of Madonna della Ghiara is a beautiful Renaissance domed structure dating from 1597. There are Renaissance palaces, and the house where Ariosto was born. The centre of an agricultural district, Reggio exports cheese, rears silkworms, and manufactures textiles, brooms, and leather goods. Founded in 187 B.C. by Lepidus, when he built the Via Aemilia, it flourished under the Romans, and became a bishopric in 450. In medieval times the city was an independent

republic, passing under the control of the Este family in 1409. Overrun by the Allied 5th army, April 25, 1945, after the Germans had withdrawn, it escaped damage in the Second Great War. Pop. 105,590.

Regia Aeronautica. Name of the former Italian air force. This was rapidly developed and expanded under fascism, but its first experience of active service was inglorious — bombing and machine-gunning defenceless Abyssinian towns in 1935. Regia Aeronautica took part in the Spanish Civil War (*q.v.*), where its tactics, machines, and crews were overshadowed by those of its German ally. When Italy entered the Second Great War, her air force had a front line strength of some 2,000 aircraft, but only about 75 p.c. was available for home concentration, the remainder being in Libya and E. Africa. The potential strength of Regia Aeronautica lay not so much in numbers as in strategic mobility. Well equipped bases on the mainland brought Malta within easy range of Italy, while from Libya Italy could attack Alexandria and Greece. One of the chief Italian aims was the production of a fast long-range bomber to dominate the Mediterranean; the most efficient machine of this type was the Savoia 79.

Of the war-time strength of the Italian air force, approximately half was in bombers, while there were squadrons of aircraft specially designed for low flying attack on ground objectives. The machines were nearly all of a composite wood and metal construction, which made for flexibility and cheapness. But the geographical position of Italy laid her aircraft factories open to enemy bombing attack unless she could command the Mediterranean, and persistent Allied bombing virtually eliminated Regia Aeronautica early in 1943, reducing it to a despised adjunct to the Luftwaffe. Throughout the war, the spirit of the air force personnel was generally lacking in aggression. On only one occasion, in Sept., 1940, did the Italian air force attack the British Isles. By the peace treaty of 1947, the Italian air force was limited to 200 fighter and reconnaissance, and 150 transport, training, rescue, and liaison aircraft.

Regiam Majestatem. Name given to a collection of the ancient laws of Scotland. It is said to have been compiled during 1124-53 at the instance of

David I. Its authenticity is doubtful, and the book is an almost literal copy of Glanvill's *Tractatus de Legibus*, written in the reign of Henry II.

Regicide (Lat. *rex*, king; *cædere*, to kill). Literally, one who kills a king. The word is specially used for those who were responsible for the death of Charles I in 1649. Of the 150 members of the court of justice that tried the king, 67 voted for his execution and 59 signed the death warrant, and these, with the officials and executioners, were the regicides. After the restoration of Charles II, parliament ordered the arrest of the regicides. Some surrendered and others were caught, but a few escaped. Brought to trial, 29 of them were sentenced to death, but the sentence was only carried out in 10 cases, the others being imprisoned for life. Three others were afterwards caught and executed. Harrison and Peters were among those executed, and Ludlow was the last survivor.

Regillus. In ancient geography, a small lake in Latium, Italy. Situated E. of Rome, between Gabii and Labicum, it was famous for the defeat of the Latins by the Romans, 496 B.C. The story of the fight is told in Macaulay's *Lays of Ancient Rome*.

Regiment (Lat. *regimentum*, government). Organized body of troops under a field officer. In the British army it is the largest permanent unit, and is made up of companies, troops, and battalions or squadrons. The term regiment was first used in Cromwell's new model army, each unit of cavalry or infantry being called a regiment, and usually taking its title from the name of the officer commanding it. Cavalry and infantry were in companies for administrative purposes. As warfare became more tactically complicated, the battalion and squadron were established as fighting formations, but battalions of several thousand men proved too unwieldy for tactical and administrative purposes, and were gradually reduced until each formed only a fraction of a regiment.

With the establishment of the British standing army in the reign of Charles II, the new cavalry and infantry units were formed into regiments and numbered consecutively in order of seniority. Thus the Royal Scots, a regiment which had served with the king in exile, became the 1st Foot and senior infantry regiment of the line; and the Queen's Regiment, the first to

be raised in England for the new army, became the 2nd Foot. Early in the 18th century, the infantry regiment was generally fixed at a strength of 1,000 officers and men, but occasionally it had two battalions, each 1,000 strong.

In 1881 the infantry regiments were given county designations, and the single battalion numbered ones were amalgamated to form regiments of two battalions. Seniority continued to be based on the original line numbers. As now constituted, a British infantry regiment has two regular battalions each of approximately 950 officers and men commanded by a lieutenant-col. To simplify training and drafting, infantry regiments in 1947 had their second battalions reduced to skeletons. Attached to each infantry regiment are Territorial army and cadet force battalions, and each complete unit is under a colonel. Some regiments have no territorial designations, e.g. the Guards, the Rifle Brigade, the King's Royal Rifle Corps. The Royal Engineers, Royal Signals, R.A.S.C., and Royal Armoured Corps also rank as regiments. Until the Second Great War, the Royal Artillery was a single regiment, but it is now divided, the term artillery regiment replacing the old designation of battery.

During the Second Great War were added to the British army the Parachute Regiment and Glider Pilot Regiment. In 1942 there was raised the R.A.F. Regiment for the ground defence of airfields and to act as an airborne striking force. Cavalry regiments are complete combat units, not divided into battalions. Foreign regiments are usually much larger than British, frequently having four battalions, with artillery and ancillary services. See *Army*; *Battalion*; *Infantry*; also separate entries on regular regiments of the British army.

Regimental March. Piece of music officially approved by the War office to be played by a British regiment at the march past, or other official regimental occasions, and occasionally upon the dismissal of a parade. Most regimental marches were adopted during or after the Napoleonic Wars, and in general the tune chosen was associated with the county in which the regiment had been raised; which explains the unmartial bucolic and love songs peculiar to many regiments. Among these are: *Here's to the Maiden* (King's Liverpool); *We've Lived*

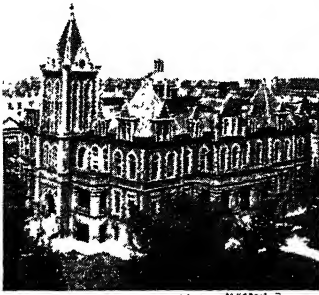
and *Loved Together* (Devon); *Young May Moon* (Sherwood Foresters); *Corn Rigs are Bonny* (Royal Lancs); *A Southerly Wind* and *a Cloudy Sky* (E. Surrey); *The Lincolnshire Poacher* (Lincs); *John Peel* (Border); *Speed the Plough* (Suffolk); *My Boy Willie* (Royal Tank); *Begone Dull Care* (Royal Signals); *Bonny Nell* (R.A.M.C.); *Within a Mile o' Edinbro Town* (Cameronians); and *The Yorkshire Lass* (E. Yorks).

Among the more martial tunes of English regiments are *Ca Ira*, the French revolutionary song adopted by the West Yorkshires; *Men of Harlech* (South Wales Borderers); *Prince Albert's march* (Somerset L.I.); and *I'm Ninety-Five* (Rifle Brigade, commemorating the fact that before they were taken out of the line to become riflemen they were the 95th Foot). The British Grenadiers, regimental march of the Grenadier Guards, is also that of all fusilier regiments.

All Scottish regiments have pipe bands, and as the bagpipes are adapted to battle songs or laments, most of the Scottish regimental marches are of a stirring air: *Blue Bonnets over the Border* (King's Own Scottish Borderers); *Cock o' the North* (Black Watch); *Hielan' Laddie* (Scotts Guards); *March of the Cameron Men* (Cameron's); *Scotland for Ever* (Seaforth's); *The Campbells are Coming* (Argyll and Sutherland Highlanders); *Garb of Old Gaul* (Scotts Greys). The Royal Scots, oldest regiment in the British army, marches to *Dumbarton's Drums*, recalling that the regiment was enrolled by the earl of Dumbarton in 1660. Several English regiments have Scottish marches: *Highland Pipers* (Hampshire); *Lass o' Gowrie* (Middlesex and W. Kent); *A Hundred Pipers* (Essex); *Wha Wadna Fecht for Charlie* (Cheshire) not a relic of the Forty-Five, but commemorating Sir Charles Napier, colonel of the regiment at the battle of Melanee.

David Le Roi

Regina. Capital of Saskatchewan, Canada. It is in the S. of the province, in the centre of the wheat-growing area, 360 m. W. of Winnipeg, and on the C.N.R. and C.P.R. Its chief buildings are the new home of the provincial legislature and the city hall. It is the residence of the lieutenant-governor, and was for a long time the headquarters of the Royal North-West (now Canadian) Mounted Police. Industries are



both distributing and manufacturing. For the former are grain elevators, warehouses, etc.; the latter include the making of agricultural implements, motor cars, bricks, and machinery, as well as meat packing and oil refining. Before the foundation of the province of Saskatchewan, Regina was the capital of the North-West Territories. Pop. 64,000.

Regiomontanus (1436-76). German mathematician and astronomer. Born at Königsberg, in Franconia (hence his name, a Latin version of the name of his place of birth), June 6, 1436, his real name was Johannes Müller. Educated at Vienna, he became the pupil of Georg Purbach, and with him translated the works of Ptolemy, Apollonius, Archimedes, and Hero of Alexandria. In 1533 was published his *De Triangulis Omnimodis*, a treatise on plane and spherical trigonometry, and *Algorithmus Demonstratus*, 1534. Regiomontanus established an observatory at Nuremberg and compiled tables of eclipses and other astronomical data. His help was requisitioned by Pope Sixtus IV in connexion with the reform of the calendar, and he died in Rome, July 6, 1476.

Regional Commissioner. Official appointed in the U.K. in the Second Great War to administer civil defence services in one of the regions into which the country was divided. There were ten regional commissioners for England, one for Scotland, and one for Wales. Each was responsible to the minister of Home Security, but had authority to settle, without consulting London, all immediate

problems arising from severe air raids. See Civil Defence.

Register (L. Lat. *registrum*, book of record; ultimately from *regerere*, to bring back). Written account or record; official list of particulars, such as the list of persons entitled to vote at parliamentary and other elections.

Parish registers of births, marriages, and deaths were ordered to be kept by the incumbent of every parish in England and Wales by Thomas Cromwell, Henry VIII's



Regina, Canada. The Saskatchewan provincial legislature buildings. Top, left, the municipal offices

minister, in 1538. Before this time a certain amount of information with regard to well-known personages had been recorded in the monasteries, and some of these sporadic records still exist. But the new order proved unpopular, and in many cases the registers were kept in so slovenly a fashion that in 1597 Elizabeth ordered copies to be sent to the bishop of the diocese. More stringent regulations for the accurate compiling of the registers, and for their safe keeping, were enacted by law in 1812, and in 1836 came official registration by a govt. dept.

Nevertheless, despite defects and other hindrances to research, parish registers have proved of much value to students as affording contemporary evidence of the exact dates of births and deaths, and also as throwing by way of additional notes interesting sidelights upon social life and other matters which were sometimes quite unofficially added by some of the clergy. Many parish registers have been published for general information by the Harleian, Parish Registers, and other societies. (See Mortality. Consult Parish Registers of England, J. C. Cox, 1910.) Wills were registered at Doctors' Commons, Knighttrider Street, London, E.C., until 1874, when their registration and filing department was removed to Somerset House.

British shipping was first registered in 1660 under the Navigation Act. The regulations were amended by legislation in the reigns of George III and William IV. The controlling Act is now the Merchant Shipping Act, 1894, which provides for the registration of every British ship, except those of 15 tons or under, plying on the rivers or coasts of the U.K., and certain vessels of 30 tons or under engaged in fishing or trading in and about the Gulf of St. Lawrence. (See Lloyd's Register.)

The term register is also used for the sliding or adjustable plate for regulating the draught in a fire-grate; in printing, for the exact correspondence of the letterpress on both sides of a page, and of the three or four colour impositions in colour-printing.

The National Register, drawn up in the U.K. during each of the two Great Wars, in order to provide an accurate picture of the population for the introduction of compulsory service and the issue of identity cards, is separately described. See National Register.

Register. (1) Division of the human voice, arising from the nature of the vocal cords, and evincing a difference of tone-quality. As it is obvious that the tension of the cords cannot be carried beyond a certain point, the upward range is continued by means of a change of mechanism. Different teachers have different names for these registers, the most common being chest, head, and falsetto. These terms accurately describe the respective aspects of the vocal cords in the successive registers, *viz.*, lower and upper thick, lower and upper thin, and small. The aim of the teacher is to blend the registers so that the transition from one to another is effected without that abrupt change of quality known as a break. (2) Synonym for organ stops. Registration means the indication on the music of the stops which the composer desires to be used. See Voice.

Registrar OR **REGISTRARY.** One who keeps a register or record. In Great Britain a registrar was formerly called a register. In England there are registrars for the supreme courts and county courts, district registrars in large towns, registrars for companies, building and friendly societies, etc. (See Friendly Societies.) In each district there is a registrar to whom particulars of all births and deaths must be given. These registrars also issue certificates for marriages, which can be performed in their offices.

Registrar-General. Official who superintends the registration of births, marriages, and deaths in England and Wales. His headquarters are at Somerset House, London, W.C.2. The first registrar-general was appointed in 1836, and in 1874 he took over the compilation of vital statistics. By summarising the returns from the various districts the registrar-general is able to issue quarterly returns of births, marriages, and deaths; he also issues a yearly blue-book.

There is a registrar-general for Scotland, his offices being at the Register House, Edinburgh. The registrars-general and their departments are responsible for taking the national census. Quite distinct from these officials is the registrar-general of shipping and seamen. See Birth Rate; Death Rate; National Register.

Registration. Act or fact of registering. The word is used in several connexions. In Scots law it means the transcribing of documents in a public register, in order that an exact copy may be preserved for use in the event of the destruction of the original.

The registration of births, marriages, and deaths was made compulsory in England and Wales in 1836, and came into force in 1837. Before this time the only official source of information on this subject was the parish register (*q.v.*). By the Births and Deaths Registration Act, 1836, district registrars have to send copies of registers of births, marriages, and deaths to superintendent registrars, by whom they are forwarded to the registrar-general. Subsequent legislation put the onus of registering births on parents and others, and of registering deaths on relatives and others within certain limits of time after the event. Marriages are recorded by the officiating clergyman, or the registrar, at the time of the ceremony. The registration of electors is a necessary preliminary to the exercise of the franchise.

Registration. Method of protecting money and other property in transit from loss. Letters and parcels can be registered at any U.K. post office for a fee, and luggage can be registered with railway companies. Under the Crown Proceedings Act, 1947, compensation will be paid for loss of or damage to a registered postal packet due to negligence of the post office. The maximum amount of compensation payable depends on the amount of the fee paid.

Registration of LAND. Two systems of land registration are possible. The first is registration of all deeds so that a person proposing to buy land or advance money on mortgage may know that in investigating the title of the vendor or borrower he need only consider deeds in the registry. He will still have to satisfy himself that the deeds give a good title and so make it safe for him to buy it or lend money on a mortgage of the land. (*See Land Charges.*) The second system is registration of title, by which the owner of land may, on satisfying the registry authorities that the title deeds show he has a good title, have himself registered as the owner. Thereafter any prospective purchaser or mortgagee need not investigate the title deeds. He can rely on a certificate from the registry.

In 1830 a royal commission in England reported against registration of title and in favour of registration of deeds, but no action was taken. Registration of title was recommended by another royal commission in 1857 and the Land Registry Act, 1862, introduced registration of title on a voluntary basis. Little use was made of this Act or of an amended system introduced in 1875. The Land Transfer Act, 1897, made registration of title compulsory on any sale of land in any area to which the Act was applied by order of the privy council. This was re-enacted by the Land Registration Act, 1925. The intention is that registration to title should ultimately be compulsory throughout England. It is now compulsory on a sale of land in the city and county of London, Eastbourne, Hastings, Croydon, and the county of Middlesex.

A person may be registered (1) with an absolute title, indicating that his freehold or leasehold appears to be without flaw; or (2) with a qualified title indicating that there is some flaw in the title (though this is rare); or (3) with a possessory title, usually as a temporary measure indicating merely that he is in undisturbed possession and knows of no adverse claims; or (4) with a good leasehold title, this form of registration being necessary only when a leaseholder cannot register his leasehold with an absolute title, *e.g.* because he is not in a position to prove the validity of his lessor's title.

The fact that the land registry registers land with an absolute

title does not mean that a person who, unknown to the registry, has a better title, is deprived of his land. Should such a person establish his claim the land registry will compensate any person who has suffered loss through relying on the title in the register.

All changes affecting the land which, for unregistered land, would be registered under the Land Changes Act are, for registered land, entered on the register to title to the land. All later transfers of the land must be registered.

The register is divided into three parts: (1) the property register which indicates the exact position of the land; (2) the proprietorship register which indicates the nature of the title registered; (3) the charges register which indicates the charges on the land.

In Scotland there has been since 1617 in the register of sasines a system of registration of all deeds relating to land. There have been registers of deeds relating to land in Middlesex and Yorkshire since the reign of Queen Anne. In some parts of Europe registration of title has existed for centuries.

Registration of MOTOR VEHICLES. This subject is treated under Motoring.

Regius Professor. Holder of a university professorship founded by a king. The first of these were founded in 1546 by Henry VIII: chairs of divinity, civil law, history, Greek, Hebrew, and physics at Cambridge, and of divinity, civil law, medicine, Hebrew, and Greek at Oxford. In 1724 George I established the regius professorship of modern history at Oxford.

Regnal Year. System employed in Great Britain for dating Acts of parliament. Each regnal year of a sovereign begins on the anniversary of his accession; thus the regnal year one of King George VI began on Dec. 12, 1936, so that the period Dec. 12, 1947-Dec. 12, 1948, was his 12th regnal year. The last regnal year of a sovereign ends at death or abdication, and legislation passed in a calendar year which includes parts of two regnal years is dated accordingly. Thus Acts of the parliamentary session of 1910 are dated 10 Edw. VII and 1 Geo. V.

Regnard, JEAN FRANÇOIS (1656-1709). French dramatist. Born in Paris, Feb. 7, 1656, he led an adventurous life until 1683, when he settled down to play-writing. He was the most brilliant of the followers of Molière, but his comedies, *e.g.* *Le Joueur*, *Le Lé-*

gataire Universal, though witty in dialogue and clever in characterisation, are wanting in that master's depth and moral earnestness. He died Sept. 4, 1709.



Jean Regnard,
French dramatist

Regnault, HENRI VICTOR (1810-78). French physicist. Born at Aix-la-Chapelle (Aachen), July 21, 1810, he studied chemistry under Liebig, and in 1840 was appointed professor of chemistry at the École Polytechnique, Paris, becoming professor of physics at the Collège de France, 1841, chief engineer of mines, 1847, and director of the Sèvres porcelain factory, 1854. He died Jan. 19, 1878.

Regnault made a lasting reputation for his measurements of many physical constants, particularly those concerned with specific heat. He showed that the specific heat of an alloy can be obtained from those of its constituent parts, and that the specific heat of compounds bears a relation to the specific heats of the elements composing them. He also carried out a series of experiments on the densities, pressures, and volumes of gases which affected the kinetic theory of gases.

Régnier, HENRI FRANÇOIS JOSEPH DE (1864-1936). French poet and novelist. He was born

at Honfleur Dec. 28, 1864, and studied law in Paris. A disciple of Mallarmé and Verlaine, he came to occupy a leading position among those so-called symbolists. His



Henri de Régnier,
French poet

many volumes of poetry included *Poèmes Anciens et Romantiques*, 1890, in which old-time stories were rendered with new symbolic significance; *Tel Qu'on Songe*, 1892; *Aréthuse*, 1895; and *La Cité des Eaux*, 1903. Among his realistic works in prose fiction are *Le Trèfle Noir*, 1895; *La Canne de Jaspe*, 1897; *Les Vacances d'un Jeune Homme Sage*, 1903; *Le Passé Vivant*, 1905; and *La Peur de l'Amour*, 1906. Later works included *La Pêcheresse*, 1920; *L'Escapade*, 1926. He died May 23, 1936.

Régnier, MATHURIN (1573-1613). French satirist. Born at Chartres, Dec. 21, 1573, he was a poet of real genius, who showed

his independence by ridiculing the all-powerful Malherbe. He wrote some charming *poésies diverses*; but his fame rests upon his 16 satires, the first masterpieces of their kind in French literature. He died, after a dissipated life, at Rouen, Oct. 22, 1613. *Consult* Life, J. Vianey, 1896.

Regnitz. River of Bavaria. Its two head-streams unite near Fürth, and the river flows N. past Erlangen and Forchheim, and joins the Main near Bamberg. It is 125 m. long, and its chief tributaries are the Aisch, Grundlach, Aurach, and Zenn. It is navigable throughout its lower course.

Regrating (old Fr. *regrater*, to huckster). Formerly an offence against public trade. It is described in a statute of Edward VI as buying of corn or other dead victual in any market and selling it again in the same market or within 4 m. of the same place, and was prohibited as tending to enhance the price of the provisions, since every successive seller must make a profit. With regrating, forestalling (*q.v.*) and engrossing (*q.v.*) were also forbidden. The offences were misdemeanours punishable by fine, imprisonment, and pillory. The early statutes directed against them were repealed under George III. The word regrator continued, with limited use, in the sense of a dealer or middleman.

Regression (Lat. *re*, back; *gressus*, stepped). In psychology, a process of turning back from life's actual problems to the security experienced by an infant, which Jung says can even render the patient blind, deaf, dumb, and infantile.

Regular (Lat. *regula*, rule). Among the clergy a regular is a member of a monastic order, the opposite being the secular clergy who are not monastic. A regular soldier is one who joins the army for a long period and gives his whole time to it. Irregulars, on the other hand, join for a period of special need. *See* Army, British; Monasticism; Secular.

Regulus. First star in the constellation of the Lion, or Alpha Leonis. In ancient Persia it was the chief of the four royal stars. It is a bright star of about the first magnitude, and has a luminosity equal to that of 100 of our suns. It has a double satellite of the eighth magnitude.



Mathurin Régnier,
French satirist

Regulus (Lat., dim. of *rex*, king). Term in metallurgy used to describe an impure metal obtained from its oxide or sulphide by fusing one of these with a reducing agent. The term was first used in alchemy to describe impure gold and, later, antimony.

Regulus, MARCUS ATRIUS. Roman general. He became consul for the second time in 256 B.C., and defeated the Carthaginian fleet at Ecnomus. An expedition to Africa followed, in which Regulus first defeated the Carthaginians. But a Greek mercenary named Xanthippus, taking command of the Carthaginian forces, subjected the Romans to a crushing defeat, Regulus himself being taken prisoner. He is said to have been sent by the Carthaginians to Rome in 250 B.C., under parole to return if the peace which the Carthaginians desired was not arranged. So far from recommending the Romans to conclude peace, or even an exchange of prisoners, in order that his own liberty might be restored, Regulus advised them against either policy, returned to Carthage, and was brutally put to death. This story was probably invented in an attempt to justify the treatment of Carthaginian prisoners by the Romans.

Rehan, ADA (1860-1916). Irish-American actress. Born in Limerick, April 22, 1860, she spent

her childhood in the U.S.A., making her first stage appearance at Newark, N.J., in 1874. She first played in New York in 1875, and showed her versatility as a comedy actress in over 200 parts in Augustin Daly's company, 1879-99. Her famed roles chiefly on her Shakespearean parts, notably Rosalind, Portia, Cordelia, Desdemona, and Mistress Ford. She first appeared in London in 1884, returning in 1886, 1888, 1890, and 1893-95. Retiring in 1906, she died Jan. 6, 1916.

Rehearsal (Fr. *re*, again; *herse*, to harrow). Word applied, from its etymological significance of going over the same ground again, to the repetition of specific words, as when the catechist asks the candidate for confirmation to



Ada Rehan
as Rosalind

rehearse the articles of his belief, and in a secondary sense to a detailed relation of events. Specifically the term is given to the preliminary practice of a musical or dramatic work or of a ceremonial before its public performance.

Rehoboam. Jewish king. Son and successor of Solomon, his treatment of the tribes led to a revolt of all except Judah and Benjamin, and a division of the kingdom. He was author of the phrase, "My father chastised you with whips, but I will chastise you with scorpions." During his reign Judah was conquered by Shishak, founder of the XXIInd Egyptian dynasty (1 Kings 12 and 14; 2 Chron. 12).

Rehoboth. Town and dist. of the territory of S.W. Africa. The town is 60 m. due S. from Windhoek, at the head of the Great Fish River Valley. The dist. pop. of 5,000 is composed of European-Hottentot half-caste cattle breeders called the Bastards who had a native govt. until 1924, when the Bastard Administration, under the magistrate of Rehoboth, was set up. Gold has been worked since 1932.

Reich. German word meaning empire, corresponding to the English word realm. Part of the name of the Holy Roman Empire in its German version, it was adopted for the re-established empire of the Prussian kings, 1871, in the Weimar republic of 1919, and in the Nazi state of Hitler.

Reich, Das. Literary and philosophical quarterly magazine, founded in 1916 by Alexander Baron von Bernus. It ceased publication before the Nazis assumed power, and Goebbels revived the title in 1941 for a weekly. Nearly every week he wrote its main article. His articles were broadcast twice weekly over the whole German radio network. In his own evaluation, in his *Diaries* (1948) this weekly publication was the most important instrument of Germany's psychological warfare. It ceased to exist just before Goebbels committed suicide, April 30, 1945.

Reichenau, WALTER VON (1884-1942). German soldier. Reichenau was born at Karlsruhe, and joined an artillery unit in 1903. He served on the staff during the First Great War, and was made a field marshal in July, 1940, in recognition of his generalship during the campaign in the Low Countries and N. France. Reichenau commanded the German armies in the Ukraine

in 1941, and as an ardent Nazi he issued the notorious "No Pity" order, in which he commanded the German troops to be merciless in their dealings with Russian prisoners and civilians. On Jan. 17, 1942, it was officially announced he had died of a stroke, but, since he was reported to have opposed Hitler's strategy, some mystery attaches to the circumstances of his death.

Reichenbach. Name of four towns of Central Europe, the most important of which is in Saxony, in the Vogtland near the Thuringian border. It has an 11th century church with a famous organ, a house of the Teutonic knights, and was an important rly. junction and a centre of textile industry before the Russian occupation, then having a pop. of about 32,000. A second Reichenbach (Pol. Dzierżoniów), in Silesia, near Wrocław, was founded in the 16th cent., saw many battles in the Thirty and the Seven Years' Wars, and the Prusso-Austrian congress of 1790. It possesses a Gothic 16th century church, and it had a considerable textile industry before falling to Poland. Pop. (1935) 16,562. Two minor towns, one in Württemberg, another in Saxony, have less than 3,000 inhabitants each. There is a river Reichenbach in Switzerland, with waterfalls 1,000 ft. high, near Meiringen, in the Bernese Oberland.

Reichenbach, KARL, BARON VON (1788-1869). A German scientist. He was born at Stuttgart, Feb. 12, 1788, and early became interested in applications of science to industry, establishing the first charcoal furnaces and iron foundries to operate in Bavaria. He discovered paraffin in 1830 and creosote in 1832, and devoted much of his later life to the then fashionable subject of animal magnetism, claiming to have located what he called "odc force." He died Jan. 19, 1869.

Reichenberg or **LIBEREC.** Town of Czechoslovakia, in Bohemia. It is on the Neisse, 52 m. N.E. of Prague. The Rathaus, built by Neumann in 1888-93, is a fine example of the German Renaissance style, and the church of the Holy Rood dates from 1696. First known in 1348. It is an important industrial centre. Pop. 66,986.

Reichenhall. Town and health resort of Bavaria, Germany. It is picturesquely situated at a height of 1,550 ft. on the Saalach, 10 m. S.W. of Salzburg. The convent of S. Zeno, formerly an Augustinian monastery, was converted into

the convent school of the order of Englische Fräulein (English girls). The Romanesque church, dating from the 12th century, contains a relief of Barbarossa.

The saline springs, containing up to 24.5 p.c. of salt, are useful in rheumatism and pulmonary affections. They are the source of supply of Bavarian salt. An ingenious system of hydraulic machinery raises the brine over the mts., some of which are nearly 2,000 ft. high. It is conducted by an aqueduct from Berchtesgaden through Reichenhall to Rosenheim, 40 m. away. Pop. 12,000.

Reichsbank. National bank of Germany, the equivalent of the Bank of England. It was founded in 1875 to serve as a bank for the new empire, being based on the existing Prussian state bank. It had the power to issue notes and served the government as banker in various ways. Having been an instrument of Nazi financial policy, it was abolished in 1945, its functions in W. Germany being transferred to the Bank Deutscher Länder.

Reichsrat. Until 1806 the name of the German imperial government in consultation with the princes and estates. In tsarist Russia it was applied to a consultative body consisting of the grand dukes, the cabinet members, and a number of high officials appointed by the tsar. In imperial Austria it was the name of the upper and the lower houses of parliament, taken together. In Denmark (until 1866) and Sweden (until 1772) it applied to an aristocratic body of political influence, of medieval origin. In Bavaria, until 1918, it was the name for the house of peers. In the Weimar republic the Reichsrat, replacing Bismarck's Bundesrat, was the diet of the länder (states) in which the Prussian government held two-fifths of the total votes, Bavaria (during 1925-30) 10 votes only, Saxony seven, Württemberg four, Baden three, Hamburg, Hesse, and Thuringia two each, the ten other länder one each.

Reichstadt, NAPOLEON FRANÇOIS JOSEPH CHARLES, DUKE OF (1811-32). Son of Napoleon I by the emperor's second marriage, he was born in Paris, March 20, 1811, and, amid the rejoicings at the birth of an heir to the empire, was created king of Rome. On the fall of the empire, in 1814, Napoleon abdicated in his favour, but the Empress Marie Louise hastened with her child to Vienna, and no effort was made to establish his

right. Upon his mother becoming grand duchess of Parma, 1815, the lad remained in Austria, being expressly debarred from the succession to the duchy. In 1818 the emperor of Austria made him duke of Reichstadt. He died July 22, 1832. On Dec. 15, 1940, his remains were taken from Vienna to Paris and interred with those of Napoleon I in the Invalides. Rostand's play *L'Aiglon* (the young eagle), 1900, is written round the thwarted hopes and ambitions which embittered his life and hastened his death. As *L'Aiglon*, Sarah Bernhardt achieved one of her greatest successes. *Consult* The Duke of Reichstadt, E. Wertheimer, Eng. trans. 1905; Napoleon II, E. M. Oddie, 1923.

Reichstag (Ger., day of the realm). German parliament. It took its name from the informal and irregular gatherings of grandees and estates called for a given day, first by Frankish kings and later by German emperors. From 1663 to 1806 a permanent congress of envoys met at Regensburg (Ratisbon). As an elected parliament, the Reichstag was re-established in 1867 for the North German confederation, and in 1871 for the new German empire. It had at first 382, and from 1874 397 members. Together with the Bundesrat—the chamber of the German states, with votes allotted according to the size of the states—it exercised legislative power, but under prerogatives of the emperor.

After the 1918 revolution it became supreme. As a result of proportional elections, there were finally 647 deputies. The Reichsrat (*q.v.*) now corresponded to the former Bundesrat, but with curtailed powers and, together with the president, exercised a counterweight against the Reichstag. All men and women over 25 were eligible for election upon presentation by 500 signatures or by a group or party known to exceed that number of members. The Reichstag, although preserved in the Nazi system, was virtually abolished by Hitler, as he eliminated the opposition from the parliament elected in 1933, and submitted at later elections lists of Nazis only.

Reichstag Fire. The destruction by arson of the main parts of the German parliament building occurred on Feb. 27, 1933. For this a Dutch half-wit, van der Lubbe, and several German and Bulgarian Communists, among them the future Bulgarian premier G. Dimitrov, were indicted before

the high court at Leipzig. Subsequent investigations proved Nazi instigation to the plot, as a means of incriminating the Communists. During the trial in Oct. Dimitrov won a triumph over Goering, and with his fellow-countrymen secured acquittal; while van der Lubbe, apparently drugged, confessed and was executed. *See* Germany: History, pp. 3734 ff.

Reichswehr (Ger., realm defence). Name given to the army permitted to Germany by the treaty of Versailles, 1919. It was enlisted on a short-term voluntary and territorial basis and limited to a strength of 100,000. The name was retained for the conscript army developed under Hitler and fighting in the Second Great War.

Reid, FORREST (1876-1947). Northern Irish writer. He was born at Belfast, June 24, 1876, and educated there and at Christ's College, Cambridge. He wrote *The Bracknells*, 1911, and *Following Darkness*, 1912, novels which attracted the attention of E. M. Forster and other critics, who were impressed by his skill in evoking the atmosphere of childhood and adolescence, and encouraged him to continue writing, in spite of the apparent lack of success of his early books. Later novels were *Uncle Stephen*, 1931; *The Retreat*, 1936; *Peter Waring*, 1937; and *Young Tom*, which won the Tait Black prize in 1944. He also wrote critical studies of Yeats, 1915, and *De la Mare*, 1929, and volumes of autobiography, *Apostate*, 1926, and *Private Road*, 1940. He died at Belfast, Jan. 4, 1947.

Reid, THOMAS (1710-96). Scottish philosopher. Born at Aberdeen, April 26, 1710, and educated there, he was professor at Marischal College, 1752-64, and subsequently at Glasgow. In 1743 he published his *Essay on Quantity*.

In later works Reid showed himself the originator of the so-called philosophy of "common sense," meaning thereby the beliefs which all rational beings have in common. He was opposed to Berkeley's idealism, according to which we do not really perceive any external things, but only ideas. This, he taught, is bound to lead to scepticism and can be combated only by the conviction that nature affords us an immediate certainty

of our own existence and of that of sensual external things. Common sense embodies fundamental truths, independent of experience. Reid died Oct. 7, 1796.

Reid, THOMAS MAYNE (1818-83). British novelist. Born at Ballyronney, Co. Down, N. Ireland, April 4, 1818, the son of a Presbyterian minister, he emigrated to America in 1839. He saw life in many phases and served in the U.S. army in the Mexican War of 1847. His experiences are embodied in a long series of stirring novels of adventure, among which the best known are *The Rifle Rangers*, 1850; *The Scalp Hunters*, 1851; *Afloat in the Forest*, 1865; and *The Headless Horseman*, 1866. Mayne Reid returned to Europe in 1849 and, except for a brief interval in America, lived in England until his death, Oct. 22, 1883.

Reid, WHITECLAW (1837-1912). American journalist, author, and diplomat. Born at Xenia, Ohio, Oct. 27, 1837, during the Civil War he represented the *Cincinnati Gazette* as war correspondent. In 1869 he entered the office of the *New York Tribune*, of which he afterwards became editor and chief owner. Minister to France, 1889-92, in the latter year he was an unsuccessful Republican candidate for the vice-presidency. Twice special envoy to England, at the diamond jubilee of Victoria, 1897, and the coronation of Edward VII, 1902, he was appointed ambassador to Great Britain in 1905. He died in London, Dec. 15, 1912. He wrote *American and English Studies*, 1914.

His son, Ogden Mills Reid (1882-1947), after practising as a lawyer, joined the *New York Tribune* as a reporter, and eventually became editor. In 1924 he bought the *New York Herald*, and combined the two papers as the *New York Herald Tribune*, making it one of the most influential papers in the U.S.A. He died Jan. 4, 1947.

Reid Report. Report of the committee on coal mining set up under the chairmanship of Sir Charles Reid. Issued as a white paper on March 28, 1945, it advised immediate and rapid modernising of the industry and the sinking of new shafts. Its main recommendations were: (1) reorganization and mechanisation



T. Mayne Reid,
British novelist



Thomas Reid,
Scottish philosopher

of coalfields on a regional basis, all pits in each area to be under compact and uniform management; (2) creation of a central authority, with statutory powers, to conserve national coal resources. A working week of five 8-hour days; proper recruiting and training of miners, with greater opportunities for advancement; wages equal to those in industries demanding similar skill and effort, were also recommended. Many of the proposals were adopted by the national coal board when the mines were nationalised in 1947. Reid became a member of this board, but resigned in 1948.

Reigate. Mun. borough and market town of Surrey, England. It stands beneath the North Downs, 23 m. S. of London, and is served by electric rly. from London, by steam rly. from Guildford, and by Green Line, being an important road junction on the main London-Brighton road. The chief church is that of S. Mary Magdalen, mainly Perp., but with fine transitional Norman arcades in the nave. Lord Howard of Effingham is buried here. Other buildings include the town hall, market house, and a grammar school dating from 1675. There are numerous caves beneath the town. Reigate is the centre of a considerable agricultural trade; an annual fair is held.

The town grew up around a castle built and held by the Warenne family, from whom it passed to the earls of Arundel. The castle was destroyed after the Civil War, the mound of the keep, 50 ft. high, being all that remains, and the grounds are now a public garden. There was also a priory here in the Middle Ages. From 1295 to 1832 Reigate sent two members to parliament; thence till 1867 it sent one; since 1950 it gives its name to a county constituency. It was made a borough only in 1863, although some of the rights are much older. In 1921 H. Somers Somerset, of Reigate Priory, presented market and other rights. The borough includes the adjoining town of Redhill (*q.v.*). Pop. 40,538. *Pron.* Rye-gate.

Reign of Terror. Term applied to the period of the French Revolution during which supreme power was in the hands of the committee of public safety. *See* Terror, The; also French Revolution; Jacobins; Robespierre.

Reilly, Sir Charles Herbert (1874-1948). British architect. He was educated at Merchant Taylors' school and Queens' Cam-



Sir Charles Reilly,
British architect

distinguished in Great Britain, and in 1947 a fund was opened for the establishment of an annual Reilly scholarship. He designed many notable buildings, including the Liverpool students' union, the mission church of S. Barnabas, Dalston, and Devonshire House, Piccadilly (the last-named with Thomas Hastings). He was elected to the council of the R.I.B.A. in 1909, became architectural editor of *Country Life* in 1922, and was the first to advocate chaining off specified streets for children's play. He was founder and later vice-chairman of the Liverpool repertory theatre (Playhouse). Knighted in 1944, he died Feb. 1, 1948. His autobiography, *Scaffolding in the Sky*, appeared in 1938.

Reims or Rheims. Town of France, in the dept. of Marne. It lies on the right bank of the Vesle, 99½ m. by rly. (*via* Soissons) E.N.E. of Paris. It is an important rly. centre, and is linked by canal with the Aisne and the Marne. E. of the town stretches part of the plain of Champagne; to the S.W. rises the vine-covered Montagne de Reims. The main activities are the champagne industry, of which this is the centre, and the manufacture of woollens, cashmeres, merinos, flannels, etc. Reims is the seat of an archbishop. Pop. 110,749.

The cathedral was founded in 1211, but stands on the site of earlier churches, the last destroyed by fire in 1210. It is one of the noblest Gothic buildings of France. The choir was completed in 1241, and the W. façade, with its three portals with over 500 statues, also in the 13th century. The whole was completed in 1428, but the spires were destroyed by fire in 1481. The rose

bridge. From 1904 to 1934 he occupied the chair of architecture at Liverpool university. He made the school of architecture there one of the most

window over the W. portals, the beautifully carved N. portal, and the twin W. towers, 267 ft., are among famous features of the exterior. Bombardments of 1914-18 severely damaged the cathedral.

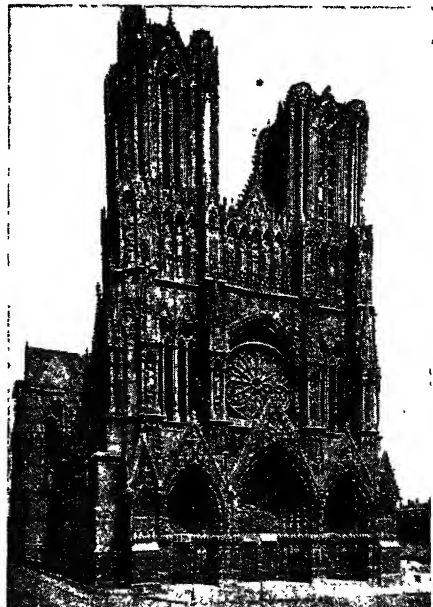


Reims arms

and reopened July 10, 1938.

In the First Great War the archiepiscopal palace (15th-17th century, with a 13th century chapel) was destroyed by fire; the fine 17th century town hall was gutted; the noble abbey church of S. Remi, 12th-15th century, and founded in the 6th century, was severely damaged. The Roman *Porte de Mars*, 4th century, still stands, but the *Hôtel Dieu* was destroyed, and the 13th century *Maison des Musiciens* demolished by shell-fire, though its famous statues were preserved.

Reims was an important Roman centre, known as *Durocortorum*. S. Remigius, bishop 459-533, baptized the Frankish king Clovis here, 496. From 987 Reims was the scene of the coronation of all French kings but six, and the archbishops acquired great po-



Reims. West front of the cathedral before it was damaged during the First Great War. The restored cathedral was reopened in 1938

litical importance. From 1420 it was held by the English, being recovered by Joan of Arc in 1429. It was captured by Marmont, 1814; by the Prussians, 1870; and was in German occupation, Sept. 4-12, 1914, at the height of the German advance which marked the opening of the First Great War; and until Oct., 1918, was under constant bombardment from German guns on the hills to N. and E. (See Marne, Battles of the.) In the Second Great War Reims was the h.q. of the British advanced air striking force from autumn, 1939, until May, 1940; and on June 10 was again entered by German troops. The city, little damaged, was liberated Aug. 30, 1944, by units of the U.S. 3rd army without firing a shot; the restored cathedral was intact. At Reims Gen. Eisenhower (q.v.) set up his h.q. in the last months of the Second Great War in Europe; and here on May 7, 1945, Col.-Gen. Jodl, chief of staff of the German army, signed Germany's unconditional surrender to the Allied expeditionary force and the Soviet high command.

Rein (ultimately from Lat. *retinere*, to hold back). Controlling or guiding strap or cord attached to the bit of a ridden or driven horse. Either of the handles of a blacksmith's tongs is also called a rein. In the plural the word is used in such phrases as the reins of government, to express control. The reins (Lat. *renēs*) is also another word for the kidneys. In architecture, the reins of a vault are the parts between the crown and abutment. See Driving.

Reincarnation. Term meaning the assumption of human nature more than once. It is used to describe the process involved in the theory known as metempsychosis or the transmigration of souls, which maintains that all personalities or types of being (including animals) enter into life upon the plane of earth, not once but many times, and assume different forms at every reappearance. According to an ancient Buddhist book, a man, according to his deeds, may be reincarnated (a) among the evil spirits in hell, (b) as an animal, (c) as a spectre or ghost, (d) as a man, (e) as an inhabitant of one of the seven realms of Heaven.

Plato, in the Republic, discusses in the form of an allegory the principle on which the condition of the reincarnate life is determined. Each soul draws its destiny by lot. If the lot determines that he shall be a king, for instance, the choice as to whether he shall be a good or bad king rests with himself. In the Phaedrus, however, he leaves less to chance. The soul which has seen most of truth comes to birth as a philosopher, that which has seen truth in the second degree as a righteous king, the next as a politician, the next as a gymnast or physician, the next as a prophet, the sixth as a poet, the seventh as an artisan, the lowest of all as a tyrant or demagogue. See Transmigration.

Reindeer (*Rangifer*). Species of deer. Found in N. Europe, Siberia, Newfoundland, Canada, and the United States, it is the only deer that has been successfully domesticated. In former times it had a considerably wider range, and its remains are not infrequently found in both Great Britain and France. It is notable for the fact that both sexes bear antlers.

Placed higher on the forehead than in other deer, they are very long and curved, and bend forward as they approach the tips.



Reindeer. Male of the North European species of deer
W. S. Berridge, F.Z.S.

The extremity in some of the varieties is broadly palmated, and there is a conspicuous brow-tine, which is usually branched and sometimes palmated. This brow-tine is placed very low and often descends in front of the face. The feet, remarkable for their breadth

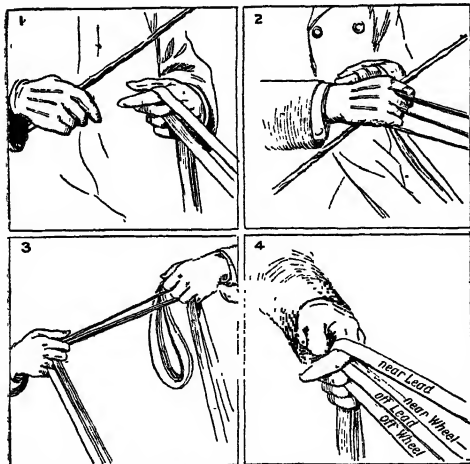
and great spread, are specially adapted for travelling on snow in winter and boggy land in summer.

The reindeer is heavy in body and comparatively short in limb; the face is long and straight, the ears short and shaggy, and the hair of the pelt is somewhat long. In colour it is usually brown, with white on the neck, underside, and inner flanks; but the colour varies greatly in domesticated specimens, which are often grey or whitish. In height the reindeer ranges from 3 ft. 8 ins. to 4 ft. at the shoulder in Europe, but it has been known to attain a height of 5 ft. in Canada.

The European reindeer occurs from Scandinavia to E. Siberia, but in many districts it is now very rare in the wild state. It has been domesticated from an early period, and it is the beast of burden in Lapland and in parts of Norway and Siberia. In the wild state it spends the summer in the grassy valleys, and moves in winter to the mountains. The American type of reindeer is commonly known as the caribou (q.v.). See Ice Age; Sledge.

Reindeer. Lake and river of Canada, mainly in Saskatchewan. The lake is in the N.E. of the prov., receives the Cochrane from the N., the Vermilion from the W., and is dotted with islands and islets. Its outflow is at the S. end by the Reindeer river, which flows almost due S. to join the Churchill.

Reindeer Moss (*Cladonia rangiferina*). Lichen or compound plant. It consists of an ascomycetous fungus and an alga in symbiotic association. It is found in abundance on heaths and hills, often in N. Europe covering vast tracts. It is a more or less erect, pale-grey plant, much branched, the ultimate divisions being pairs of short, drooping threads. It



Rein. Methods of holding driving reins. 1. Single harness. 2. Tandem. 3. Military hold for four horses. 4. Four in hand

forms a valuable food for cattle and reindeer in Lapland and other northern countries. See Lichen.

Reinforced Brickwork. Brick walls, the lateral strength of which is increased by the use of wire mesh, spread along the bed of the brickwork course at intervals.

Reinforced Concrete. Concrete reinforced by metal to take up tensile stresses and to strengthen the resistance of the material. See Concrete.

Reinhardt, MAX (1873-1943). Austrian-born American theatrical producer. Born of Jewish stock at Baden, near Vienna, Sept. 9, 1873, his real name being Goldmann, he began to study acting at 17, and soon became well known as a character actor at the Deutsches Theatre, Berlin, later achieving great success there as a producer. After directing at the Neues Theatre, he returned to the Deutsches as director, giving international fame to the German stage. He directed memorable productions of Aeschylus, Sophocles, Ibsen, Strindberg, and Calderon. In 1906 he took over the direction of the Kammerspielhaus, an intimate playhouse which served as annexe to the Deutsches. He made his reputation in Britain with *The Miracle*—a medieval pageant lavishly produced at Olympia, London, 1911.

A spectacular production of Oedipus Rex was given at Covent Garden the following year. Another notable production was *Sumurun*, a play without words. After the First Great War Reinhardt remained the leading figure of the German stage, until in 1933 he was dismissed by the Nazis. He then left Germany and settled in the U.S.A., directing in 1935 a film version of *A Midsummer Night's Dream*. He became a U.S. citizen in 1940, and died at New York, Jan. 10, 1943.

Reinhardt attempted to bring the playgoer as close as possible to the play. He increased the mechanical resources of the theatre and improved its craftsmanship at a time when naturalism was slavishly exact. His most acclaimed productions were those in which hundreds of performers took part, such as *The Miracle*, and Oedipus Rex, but it was in his productions at the Deutsches Theatre during

1905-10 that his inventive genius was most marked.

Reisner, GEORGE ANDREW (1867-1942). American Egyptologist. Born at Indianapolis, Nov. 5, 1867, he was educated at Harvard, and, after work in Berlin, became lecturer in Egyptology and director of the Hearst Egyptian expedition from the university of California during 1899-1905, leading a joint expedition sent by Harvard and Boston museum in the latter year. He conducted excavations at Samaria, 1909-10, and in 1927 published a preliminary report on his discovery at Giza of the tomb of Queen Hetepheres, a more complete account being published in 1932. Professor of Egyptology at Harvard from 1914, and curator of the Egyptian dept., Boston Museum, from 1910, he died June 6, 1942.

Reith, JOHN CHARLES WALSHAM REITH, 1ST BARON (b. 1889). British administrator. Educated at Gresham's school, Holt, and Royal Technical college, Glasgow, he became an engineer. During 1916-17 he was in charge of contracts placed in the U.S.A.

for munitions for Great Britain. In 1922 he was the first general manager of the B.B.C., then its director-general during 1927-38. He was successful in impressing upon British broadcasting during its formative years the mark of his own strong personality, insisting always on the maintenance of high intellectual and spiritual standards. An annual series of broadcast lectures, called Reith lectures after this pioneer of the B.B.C., was established in 1947.

Chairman of Imperial Airways before the Second Great War, Reith took a similar position with B.O.A.C., 1939-40, becoming M.P. for Southampton in the latter year, when he was successively minister of Information, and minister of Transport. During 1940-42 he was the first minister of Works and Buildings (the title later being altered to minister of Works and Planning). He was afterwards for a time director of Combined Operations, Material dept., at the Admiralty, and then made a 45,000 m. air tour to discuss the future organization of Commonwealth radio and cable systems. In 1946 he was elected

chairman of the Commonwealth communications council. Knighted in 1927, he was raised to the peerage in 1940. He published his autobiography, *Into the Wind*, 1949.

Reitsch, HANNA (b. 1912). German airwoman. Giving up medical training for flying, in the 1930s she broke records for gliders and in 1938 piloted a glider for 150 m. During the Second Great War she acted as a test pilot. Volunteering to make an experimental flight in a flying bomb, she was seriously injured. For this exploit she received the Iron Cross, first class. On April 26, 1945, she flew into Berlin with a helicopter, taking Gen. von Greim, then head of the Luftwaffe, to Hitler. Two days later she succeeded in taking him out again, being one of the last persons to see Hitler. Her account of the last days in the Chancellery shelter was an important historical source.

Reitz, DENEYS (1882-1944). S. African politician. A son of F. W. Reitz (1844-1934), president of the Orange Free State, 1889-96, and president of the first senate of the Union of South Africa, 1911-18, he was born at Bloemfontein, and educated there. He fought against the British in the S. African War, and went into exile with his father. Returning later to S. Africa, Reitz became a lawyer. At the outbreak of the First Great War he joined Botha, serving in the German W. Africa campaign, and later in Flanders. Elected to the legislative assembly in 1920, he was minister of Lands in Smuts's government, again serving in the same capacity in 1933. Two years later he was minister of Agriculture and in 1938 minister for Native Affairs and deputy prime minister, retaining the latter post until 1943. In 1942 he was appointed high commissioner for S. Africa in London. He died Oct. 19, 1944. His wife was the first woman member of the Union parliament.

The story of Reitz's varied career is told in his books, *Com-*

mando, Trekking On, and No Outspan.

Réjane, GABRIELLE CHARLOTTE (1857-1920). French actress. Born in Paris, June 6, 1857, her real name being Charlotte Réju, she made her début at the Odéon,



Max Reinhardt, theatrical producer



Lord Reith, British administrator



Mme. Réjane as Catherine in *Madame Sans-Gêne*

1875, and made a marked success at the Vaudeville in the same year. She was an actress of great versatility and disciplined technique, and made a memorable appearance as Catherine in *Madame Sans-Gêne* at the Gaiety Theatre, London, 1894, and in New York, 1895. The *Théâtre Réjane*, Paris, was opened in 1905, and in 1909 she toured S. America. She played at intervals in London, 1906-15, acted in film versions of her plays, and died on June 14, 1920.

Rejected Addresses. Series of English parodies. Published in 1812, it purported to be the compositions of the most popular poets of the day submitted for a prize offered on the occasion of the inauguration of the New Drury Lane Theatre. The authors were Horace and James Smith (*q.v.*), the former's best efforts being the parodies of Byron and Scott, the latter's the parodies of Cobbett and Crabbe.

Rejuvenation. The theory that life can be prolonged by the replacing of the worn-out testicular or ovarian glands with young, healthy glands obtained from the higher monkeys. It was first advanced in 1910 by Serge Voronoff (*q.v.*). It was, however, found that the transplanted glands perished in the new host. A more successful operation was introduced by Doppler of Vienna. He increased the blood supply of

the sexual glands by diverting the blood stream more richly to them.

Relapsing Fever. Acute fever caused by infection by a spirochaete. Different forms of the parasite occur in Europe, America, Asia, and Africa, and cause differences in the symptoms. The European form is met chiefly in Russia, while epidemics of the disease have occurred in the past in the British Isles. The period of incubation is believed to be about seven days.

The onset may be gradual or sudden, with severe headache, shivering fits, pains in the back and limbs, and rise of temperature. The liver and the spleen become enlarged. At the end of about a week the temperature suddenly falls, and the other symptoms disappear. In three or four days to a week, however, the symptoms recur, though the second attack may not be so severe as the first.

After recovery there may be a further relapse, and it is this characteristic which has given the disease its name. The great majority of cases recover, but in a small number complications, such as pneumonia, bronchitis, or haemorrhage, may arise and terminate fatally. The treatment is that of the group of diseases caused by the spirochaete; salvarsan, penicillin, and the sulphonamide group of drugs have been found useful.

NEWTONIAN OR CLASSICAL RELATIVITY. When Newton formulated the laws of dynamics he had to assume certain properties of space and time—the background against which the motion of bodies had to be considered. The assumptions he made were extrapolations from what might be the “common sense” outlook and were:

(1) There is a uniform even-flowing universal time, and all observers (whatever their state of motion) observing two events taking place and measuring the time interval between their occurrences will find the same interval.

(2) Similarly if they measure the distance between the points where the events occurred they will find the same distance.

The Newtonian Principle

These two postulates, with Newton's laws of dynamics, led to the Newtonian principle of relativity. If one observer ascertains from his experiments that Newton's laws of dynamics are correct any observer moving relatively to him with constant speed and along a straight line will also deduce from his experiments that they are correct.

For example the pendulum of a clock will swing in just the same way on a smoothly moving train or boat as in a house. If there are accelerations (jerks) it will, however, behave differently. The principle of relativity allows one to deduce what in fact the behaviour of the pendulum will be if the peg is not moving with constant speed in a straight line but, say, compelled to move in a circle. This is of course just the case of a pendulum on the earth and the behaviour of the pendulum may be used to demonstrate the earth's rotation (Foucault's pendulum). Centrifugal forces, etc., may thus be calculated.

It will be seen that Newtonian relativity can be used to compare the observations of any two observers, whatever their state of motion, but that its applicability is restricted to dynamics. It is this restriction which eventually led to its downfall.

DIFFICULTIES OF NEWTONIAN RELATIVITY. During the 19th century the work of Faraday, Maxwell, and Hertz established that light was an electromagnetic wave. The propagation of light through empty space, together with the desire to have a medium in which the wave motion could take place, led to the ether hypothesis. According to this there is an all-pervading massless

RELATIVITY: TIME, SPACE, AND MATTER

H. Bondi, Lecturer in Mathematics, Cambridge University

This article, which gives a general account of the Theory of Relativity, should be read in conjunction with those providing details of individual aspects of the subject: Geometry; Gravitation; Matter, etc. See also biographies of the scientists concerned: Einstein; Newton; Riemann.

The principle of relativity is the term applied in physics to a statement of the laws which determine how the results of experiments depend on the experimenter's state of motion, *e.g.* these laws should explain how experiments (say, measurements of the time-keeping of a clock) carried out on a merry-go-round should differ from similar experiments carried out on the ground.

The principle is of great importance to physics for two reasons:

(1) All experiments are, in effect, carried out on a merry-go-round, *viz.* the earth. Unless we know clearly how the earth's motion affects their results we cannot state any intrinsic laws or apply them to any subject not dealing with the earth's surface.

(2) Modern physics is greatly concerned with fast-moving par-

ticles. Now while we know from experiments how various forces affect slow particles, the only way we can apply this knowledge to fast particles is to imagine an observer travelling with the particle. To this observer the particle would seem to be still, and he can apply the knowledge gained with slowly moving particles to this fast particle, thus determining the forces acting on it. But the knowledge acquired by this imaginary observer is useless to us unless it can be translated back to the real observers, and the principle of relativity is required for this translation. In order to explain the great changes in our knowledge of the laws of relativity it is desirable to consider the views held before the beginning of this century. The following laws were then assumed to be correct:

substance, the ether, in which this wave-motion takes place. The waves are propagated through this medium at a finite velocity, the velocity of light, which had been long before determined by Römer.

The ether must be assumed to be quite unaffected by the motion of material bodies, for otherwise there would be strange refraction effects near the moon and the planets. These are not observed.

Since light is propagated in the ether with the same velocity in all directions an observer moving through the ether should find that light is propagated more slowly in front of him than behind him, so that he will observe an "ether wind."

Ether Wind Disproved

This was not a particularly agreeable concept, but it was a clear and logical consequence of Maxwell's equations of electromagnetism, even, it could be shown, without the ether hypothesis. Therefore surprise was considerable when the Michelson-Morley experiment (1886) proved the non-existence of the ether wind. Theories proposed to explain the absence of the effect assumed that motion through the ether altered the lengths of all material bodies, including measuring rods, so that the velocity of light always appeared to be the same in all directions (Fitzgerald contraction). Lorentz found the full code of translation from one observer to another in relative constant velocity straight line motion. This reduced to the Newtonian code for slow motions (dynamics), but gave the right answer for high velocities (light). These formulae constitute the famous Lorentz transformations, which replaced the Newtonian formulae. The reason for the breakdown of the "obvious" Newtonian relativity remained obscure. The situation was highly unsatisfactory until 1905.

SPECIAL OR RESTRICTED THEORY OF RELATIVITY. In that year Einstein showed that the Newtonian concepts of a uniform even-flowing time and an absolute space lacked physical relevance.

His argument was based on the fact that nothing is known that travels faster than light. Hence if two moving observers wish to communicate with each other in order to synchronize their clocks, compare their standards of length, etc., their speediest way of doing so is by electromagnetic waves. Although the speed of light is great it is not infinite, and Einstein

could easily show that for fast moving observers this method of signalling did not allow them to connect their space and time reckonings sufficiently well to establish the same time and space scales. However, the standard velocity of signals, the velocity of light, would appear to them to be the same, just as the Michelson-Morley experiment had shown.

Einstein thus proposed a new principle of relativity. If Maxwell's equations of electromagnetism and certain simple laws of dynamics were correct for some observer, then the same laws would hold for any other observer moving relatively to the first in a straight line with constant velocity. It follows that the correct laws of transformation are those proposed by Lorentz and that what were called above "certain simple rules of dynamics" were laws which hardly differed from Newton's for small velocities, but differed appreciably for large ones.

Space-Time Combination

For two events taking place at two different places, according to Newtonian relativity, all observers will agree on the distance between the two points and on the time interval between the two events. This is not so according to the Lorentz transformations. The order of occurrence of the two events may even appear to be different to different observers. However, though neither spatial distances nor time intervals are sacrosanct, a certain combination of the two will appear the same to all observers. The reason for the existence of this invariant combination is simple. While time is partly a subjective quantity defined by each observer for his own convenience, it has also an objective meaning in the history of each particle. It is an objective fact that a certain train left King's Cross before it arrived at York, and all observers must agree on this. Now consider again two events at different places. Light from one event may reach the place of the other event before, during, or after the occurrence there of this second event. Which of these is true is an objective fact on which all observers must agree, being described by the invariant combination of distance and interval. Since no effect can travel faster than light this means that the causal order is preserved.

The real significance of this intermingling of space and time was first pointed out by Minkowski. The three dimensions of space

appear different according to the way one is facing, while distance, computed from all three, does not depend on which way one is looking. This fact is stated as the three dimensional nature of space.

Similarly, as Minkowski stressed, time interval and distance depend on one's state of motion, but their combination does not. This limited convertibility of space and time may be stated as the four-dimensional nature of space-time. To speak of a fourth dimension does not denote anything mystical which one cannot "imagine," but is simply a way of stating the experimental fact that measurements of both time intervals and spatial distances are affected, in a certain linked way, by the state of motion of the observer.

Effect of Velocity On Mass

The meaning of the Lorentz transformations may be illustrated by considering the addition of velocities. Imagine the configuration consisting of an observer, a particle which he observes to be moving away from him with a certain velocity, and a second observer moving away from the first one with a different velocity in the opposite direction. How fast does the particle appear to be moving to this second observer?

According to Newtonian ideas, with a velocity equal to the sum of the two velocities mentioned, but according to Einstein and Lorentz, with a somewhat smaller velocity. As long as both the particle and the observer move slowly it is little less than the sum. If, however, either of them moves nearly as fast as light, the observed velocity will be much smaller, so that in no case can it exceed the velocity of light.

This impossibility of exceeding the velocity of light shows itself in an increasing resistance of matter to further acceleration when it is already moving fast. This increase of inertia (or mass) with velocity has been confirmed by experiment. It is, for instance, noticeable in atom-splitting machines. If electrons are given an energy of one million volts they move at 95 p.c. of the speed of light, and their masses are three times as great as when they are at rest. At five million volts they are only slightly faster (99.6 p.c. of the speed of light), but they are 11 times as massive as when at rest.

Einstein was able to show that the equations of dynamics and electrodynamics could be brought into this relativistic four-dimensional form with changes which were small for small velocities but

gave the right result for large velocities. This four-dimensional formulation has been confirmed experimentally. An important result is that mass represents energy, the conversion factor being the square of the velocity of light. The great magnitude of this factor indicates that even a moderate mass represents a tremendous accumulation of energy. If a body loses energy (e.g. by radiation) it also loses mass.

The experimental verification of the special theory of relativity are so complete that it is universally accepted. It covers electromagnetism and a large part of dynamics, but has two severe limitations: (1) it applies only to observers in uniform straight line motion; and (2) it does not include gravitation.

These two deficiencies soon led Einstein to look for a wider principle. The difficulties of formulating such a principle are evidently great. It is clear from everyday life that relatively accelerated observers have different experiences. The jerk experienced in a sharply braking train or car, the centrifugal force experienced when quickly rounding a corner, all bear evidence that relatively accelerated observers experience different forces. Accordingly, a general theory of relativity cannot postulate that the experiments of two mutually accelerated observers should have the same results, but can only require that the laws of nature discovered by our two observers should be the same in form. This formal equality should provide tests which any observer can apply to decide whether space is empty or not, to show that energy (mass) is conserved, etc.

Clearly these universally applicable tests had to be devised in such a way that they eliminated the effects of the observer's accelerations. Now the effects of jerks are well known in Newtonian dynamics, where they appear as additional forces, due to the motion of the observer and his system of reference. All these forces have an important property in common. They are proportional to the mass of the body on which they are acting. The reason for this is simply that all free bodies move (in the absence of gravitation) with constant speed along straight lines. Hence they all appear to the accelerated observer to have the same acceleration.

This property shared by all these apparent forces is common also to

one other force: gravitation. The equality of inert and gravitational mass (which is the reason why all bodies fall equally fast) had been known since the time of Galileo, and had been verified by Eötvös with very great accuracy. No explanation was given until Einstein expressed the view that gravitation, like centrifugal force, was due to the choice of one's system of reference. The natural observer, he said, was a freely falling one, not one held up by a complicated structure like the floor. Such a freely falling observer would not see any action of gravity in his neighbourhood since all other bodies would fall at the same speed. But it is more difficult to see how he should deal with distant objects falling differently. Einstein showed how this difficulty could be overcome by adopting a system of geometry slightly different from the Euclidean one, viz. the system investigated by Riemann (*q.v.*).

GENERAL THEORY OF RELATIVITY. In 1916 Einstein showed how to use this geometry so that any two observers, irrespective of their states of motion, could formulate the laws of nature in the same way, eliminating the influence of all jerks and of gravitation. These Newtonian forces were replaced by new concepts. Gravitation was no longer a force governed by Newton's famous inverse square law, but a deviation of the geometry of space-time from the Euclidean one, a so-called "curvature of space," which was due to the presence of matter. In this space-time the orbits of particles and light rays are determined by the simple requirement that they should be shortest distances (which are not straight lines in the presence of space curvature).

Verification by Observation

Newton's law of gravitation had been a fundamental law applied and tested in great detail in the solar system. It was now replaced, not by another law of force, but by something radically new, a "geometrisation" of dynamics. However, the new law gave almost the same planetary orbits, etc., as the old ones. Attention was immediately focused on the minute differences between the old and the new predictions and it was found that three of these should be just observable, viz. (1) light rays grazing the sun should be deflected by an angle of $1.9''$ (relativity) instead of at most $0.9''$ (Newton); this effect can be observed only during a solar eclipse; (2) the elliptical orbit of the planet

Mercury should appear to rotate very slowly ($0.44''$ per year) about the sun (relativity) instead of being fixed (Newton); and (3) light emitted by atoms on the surface of the sun should, according to relativity, appear to be very slightly redder than light from similar atoms on the earth.

All three effects have been verified observationally, the first one most spectacularly by the solar eclipse expeditions sent out in 1919 for this purpose by the Royal Society at the instigation of Sir A. S. Eddington. However, the effects are so near to the limits of the instruments used that the observational errors are not very much smaller than the effects measured.

The general theory of relativity has gained wide, though not universal, acceptance. It has been applied with some success to the theory of the universe as a whole, and in 1950 was further generalised by Einstein to include electromagnetic as well as gravitational forces in a unitary field theory.

A different school of thought, led by E. A. Milne, has rejected general relativity and developed a new approach called kinematical relativity. So far, however, no experimental method has been devised for testing these later theories. *Consult* Space, Time, and Gravitation, Sir A. S. Eddington, 1920; *The Theory of Relativity*, A. Einstein, 1920; *Space-Time—Matter*, H. Weyl, 1922; *The Evolution of Physics*, A. Einstein and L. Infeld, 1938.

Relativity of Knowledge.

Theory, variously formulated, that knowledge is only relatively true. (1) Positive knowledge is impossible, owing to the ever-changing nature of the data of sense; we do not know things as they really are, but only as they appear to us. This is the doctrine of Protagoras: man is the measure of all things; all knowledge is relative; each thing is for each man as it appears to him. (2) Our knowledge of particular things depends upon the relations in which they stand to other things. (3) In psychology, the view that sensations possess importance only when related to other simultaneous or immediately previous sensations in the mind.

Relator. English law term. An action will lie at the suit of the attorney-general for a tort (generally a nuisance) of a public character, but the attorney-general proceeds not by writ but by information (*q.v.*); and he proceeds

either of his own motion, or is set in motion by someone who really brings the action himself, but procures the attorney-general's consent to use his name. Such a person is called the relator.

Relay. Device in electrical engineering, by means of which a weak current can be made to control a strong one. It was first used on long telegraph lines which were divided into sections, the faint signals at the end of each section operating a delicate electromagnet which attracted a moving iron armature that opened and closed contacts which repeated, or relayed, the signals along another section.

Many hundreds of different types, operated in many ways—electromagnetic, thermal, induction, gas-pressure, etc.—have been developed for particular purposes, all having the same basic principle that, when a current is passed through the operating circuit, the moving contacts close (or open) either one or a number of associated circuits, instantaneously or with some form of time delay. The relay is the basis of all automatic control; e.g. an automatic telephone exchange uses thousands of relays in its complicated switching operations. On an electric power transmission system, "protective" relays, by operating circuit breakers, isolate faulty sections of the system. *See* Circuit, Electric; Remote Control.

Relay Race. In athletics, a race in which several runners compete on either side, each covering a certain distance, his place being at once taken by a succeeding runner, until the tape is reached. The idea was possibly derived from the torch-race (*lampadēdromia*) of the Greeks, in one form of which the runners passed on a lighted torch to a waiting comrade. Nowadays a baton is handed on. A similar procedure is sometimes adopted in cycling and swimming; in the latter each swimmer starts as his predecessor touches an end line.

Release. Term used in English law to describe the discharge of any right on any action. A release of a debt is an extinguishment of the debt, thus differing from a receipt, which is merely *prima facie* evidence of payment. A release may be of a right of property; as where a partner, on retiring, releases all his rights in the partnership property to the remaining partners; or where a lessor releases to the lessee the reversion expectant on the termination of the lease. *See* Receipt.

Relic (Lat. *reliquiae*, remains). In a religious sense, the body or part of a body of a saint or martyr, or some article, such as clothing, associated with a saint or martyr, preserved as an object of devotion or veneration. Generally, the word implies that which is left of an object after the loss or decay of its other parts, as a souvenir of one who is dead. Examples of religious relics are the remains of holy men preserved in churches or shrines: fragments supposed to have belonged to the true Cross (*q.v.*); and the Holy Coat of Treves (*q.v.*). Veneration of Christian relics began about the 4th century; it received marked impetus during the crusades; its persistence is exemplified by the search at Glastonbury for the Holy Grail (*q.v.*), or cup which held the wine blessed at the Last Supper; a strong reaction set in against it at the Reformation, and it is condemned by Article xxii of the English Prayer Book.

Burial places of martyrs were chosen by the early Christians for their meetings or services. Later, churches were built over the remains; and at one time consecration of a church was dependent upon the possession by that church of some holy relic. Gradually relics came to be associated with miracle working. Desire for the possession of them inspired the secret and fraudulent removal of remains from one church to another. In 1215 the fourth Lateran Council forbade relics to be sold or exposed outside of their cases or shrines, and prohibited veneration of relics until their authenticity had been decided by the pope. The custom, virtually unknown among the Jews, is common to both Roman and Greek Churches. *See* Altar: Miracle; Shrine; Worship of the Dead.

Relief (Lat. *relevare*, to raise up). Literally the removal of an evil. It is frequently used in connexion with distress arising from unemployment and the like. Relief works are works of a public character, like construction of arterial roads, undertaken to provide employment in times of distress. The word was used in connexion with the administration of the poor laws, as in the phrases outdoor and indoor relief. (*See* Poor Law.)

A relief map is one on which the form of the country is indicated by some conventional method such as the layer system. *See* Map.

Relief. In the feudal sense, a payment made by a tenant to his lord on taking possession of an estate held under him. Feuds

originally gratuitous, were also precarious, and held at the will of the lord, but as a more permanent degree of property was introduced, they began to be granted for the life of the feudatory, although they were not hereditary. When feuds became hereditary, the relief was continued on the death of a tenant, although its original foundation had ceased. Being at first arbitrary and at the discretion of the lord, who by demanding an exorbitant payment could in effect disinherit the heir, reliefs were regarded as one of the great grievances of tenure. William the Conqueror therefore fixed the relief at a certain quantity of arms and habiliments of war, and in the reign of Henry II a composition of 100 shillings was universally accepted for every knight's fee, until relief was abolished together with other feudal anachronisms. *See* Feudalism; Land.

Relievo. Italian term for the sculpture in relief used in the decoration with figure compositions of walls and other flat surfaces. The Greeks and Romans practised this kind of sculpture in its simpler forms. Some later Hellenistic work shows the introduction of pictorial or perspective treatment, i.e. relief with differences in plane, and the commemorative columns erected in imperial Rome were a distinct effort after perspective effect. This art, however, made little progress during the Middle Ages. Donatello's John Baptist on the font at Siena, completed in 1427, shows the treatment in a modified form, but Ghiberti's gates for the Baptistery at Florence are the first conspicuous instance of its employment. *See* Archaeology. Babylonian; Bambino illius. Bellerophon illius. Cleopatra illius. p. 2148; Door illius. p. 2782.

Religio Medici. Sir Thomas Browne's statement of his belief. It was written about 1635, and is quite short. It is divided into two parts, dealing with faith and charity. A devout member of the Church of England, Sir Thomas accepts the Christian belief in its entirety, finding in its mysteries and doctrinal difficulties only a further aid to faith. In this the Norwich doctor represents his age, but the tolerant and large-hearted way in which he speaks of other creeds shows him far in advance of it. The prose style is magnificent, if heavy with Latinisms. The work was popular abroad, being translated into several foreign languages.

RELIGION AND ITS SYSTEMS

Rev. J. W. Oman, D.D., Former Principal Westminster College, Cambridge, and E. G. Harmer

This article concludes with a section on the extent to which the various religions prevail throughout the world, a subject illustrated by a colour map. See the articles on the great religions; Buddhism; Christianity; Confucianism; Mahomedanism; those on their various branches, e.g. Roman Catholic Church; and the Lives of their founders. See also the entries on religious terms, e.g. Priest, and on religious movements, e.g. Reformation

The probable origin of the word is the Latin *religare*, to bind, and the most general mark of religion is this obligation of the sacred. Religion has been defined as "that which deals with the relation of God and man." But a really comprehensive definition of the term is a matter of difficulty.

In the 18th century, when religion was regarded as chiefly supernatural information about the deity and miraculous interference in events, it was not impossible to define and easy to describe. Then the study of it was confined to the task of weighing by argument the evidence for past events, with the clear issue that, though all religions might be false, only one could be true. But, at the close of the century, the Romantic Movement, with its sense of variety in human nature and of action and progress in history, discovered in religion a fundamental element of mind which enters into every aspect of life, is a prime moving force in all history, and the truth of which can be measured only by the whole range of spiritual values. Large investigations then opened out in three distinct directions. The first is occupied with the actual forms and faiths in which religion has manifested itself, the second with its special place in the human mind, and the third with the nature of the external reality on which it depends. Thus we have the history, the psychology, and the metaphysic of religion.

Idea of the Sacred

But if we cannot begin with definition or achieve adequate description, we have the greater need of some distinctive mark to separate what belongs to the subject from what is only accidentally connected with it. A sufficient mark is the idea of the sacred. Yet this must not be conceived either too narrowly or too widely. Much has been truly and even effectively religious which stirs no feeling merely of awe in our minds, while magic, though regarded with awe, and many myths, were rather primitive science and primitive poetry than primitive religion.

When religion is thus conceived, the study of it is much more than the investigation of evidence for

the supernatural, and we can no longer make a clean cut between true and false religions. But this does not mean that the question of truth is set aside. The sacred is concerned with an absolute claim not to be reduced to the convenient or the prudent, but valid only if the values it affirms have objective reality, both as the true nature of man and the ultimate meaning of the world. That reality, therefore, alone can be the final interest in any part of the study; and an unbiased pursuit cannot mean, as is at times assumed, an absence of personal interest in the result, but should mean, as in other studies, that no interest we can have could be forwarded except by the truth.

Experience and Interpretation

If religion has to do with feelings, and trusts, and aspirations, and not merely with the rites and creeds which give them expression, it requires, more than most subjects, our own experience for its interpretation. Indifference to truth is not the necessary equipment for discussing religion without bias. We may not start with our own particular form of Christianity as the externally given perfect form of religion, and pick out what agrees with it and dismiss the rest. Yet it is only as we have a higher religious experience that we can hope to understand the lower.

The history of religion now covers an immense area of investigation. On the subject of primitive religion alone there is an extensive literature, and the sacred books and critical histories of any one great religion present a formidable amount of material.

Fuller investigation has made ever more doubtful the assertion that races are to be found wholly without religion. Without some sense of the sacred, making a higher demand than convenience, and giving a securer trust than the working of blind forces, man would scarce have arrived at the stage of being human. But, even if some tribe were discovered too low in the scale to be religious, it is certain that at a very early stage of culture religion appears as inevitably as curiosity about the world around or the attempt to organize society; and, if it thus manifests itself as soon as oppor-

tunity offers, no more is necessary to prove that religion belongs to essential human nature.

The study of primitive religion seeks, as it were, to isolate the original germ. With regard to what can be achieved two mistaken ideas may be entertained. The first is that we may thus discover the origin of religion. Even the rites and ceremonies in which religion first expressed itself are beyond our knowing; and we have no means of discovering the thoughts and feelings they expressed, which are the real religion. But, even if we could, we still have not reached the origin of religion, which is, not how the idea of the sacred first came into use, but how it arose. That is a problem of mind, and not of history. The other is that the study may dispose of all religion as superstitions of the childhood of the race. If life's higher values were evolved out of it, we cannot dispose of even the lowest religion as superstition.

Evolution is not a device for getting higher values out of lower without anything being added, but at best some help towards showing how it was added, which still leaves what is added precisely the new, and therefore, the inexplicable. Wherefore, religion, like all else that has entered into human life, must be estimated by what it is, and not by how it came to be. Even when the results offered are less ambitious, they must be received with caution. They are reached mainly through ancient writings, agricultural myths and customs, and the religion of savages. But a community which writes and tills the soil is not primitive, and the childishness of the savage is no sure guide for knowing the progressive childhood of the civilized. Yet, in spite of these difficulties, it now seems reasonably certain that the attitude towards the world which religion requires was first related to a sense of a power in things resembling man's own life; that the awe of the sacred world was early stirred by the great forces of nature; that religion was from the first social in its expression and the sanction of social bonds; and that it was the mother of arts, the instigator of inquiry, the spring of moral obligation, and possibly the source of reason itself.

Progress of Religion

The second branch of this historical study deals with the progress of religion. It may concern itself generally with a broad survey of the evolution of religious values, showing how the sense of the sacred detaches itself from the material things which first stirred

the sense of awe and is turned into reverence for truth and beauty and goodness, how redemption moves from deliverance from the physical ills which work bodily harm to victory over all the evil that is in the world by reconciliation to a purpose which is over them and beyond them, and how in that progress the spiritual faculties of the human race are liberated and exalted.

Methods of Classification

More recently the various religions have claimed attention, because all historical study of the subject confirms Schleiermacher's view that each religion is an organic whole, to be estimated not merely by weighing the proportion of its higher and lower elements. Yet, if we are to regard the religions as stages of progress, we must classify them, not merely geographically, but on a principle which will arrange them in some order of lower and higher.

The primary division put forward by Schleiermacher was between "religions without founders" and "religions with founders." This agreed with his view of religion as intuition of the universe, and of the religions as distinct intuitions; for a higher religion was impossible without some original religious genius to produce the intuition by which it was organized. This distinction between what we may call unprophetic and prophetic religions is of the utmost importance, as appears in the progress from the 8th to the 6th century B.C., due to such great prophetic persons as Zarathustra, the Hebrew prophets, Socrates, Buddha, Confucius, and Lao-tse. Nor may we ignore the influence of Moses on the national Hebrew religion; and there may be no religion which is not in some sense prophetic.

The division of religions into national and universal, or natural and ethical, is practically parallel but national and universal elements are not always distinct; and, unless we restrict ethics to our own moral standards, there is no religion but is in some sense ethical. To the division into religions of nature and religions of redemption there is the objection that every religion is concerned with redemption, if only from the ills that threaten the bodily life. But that fact affords us the true principle of division, which is the kind of redemption each religion offers, to which must be related the values in man worthy of being redeemed, and the purpose above the world by which they are to be realized, and, therefore, the idea of God on which the purpose depends.

On this principle the following classification is suggested: (1) Religions of the natural life and of an animistic force, vaguely many and indefinitely one, whereby man seeks outward security through a power as personal as his own dim sense of his own personality in the communistic stage at which he lives permits. (2) Religions of anthropomorphism and external morality, whereby, having become an individual possessing property, man seeks to secure his state by beings like himself, who lay down external rules for what is yet mainly an outward life. (3) Religions of ecstasy and asceticism and a cosmic morality, which either do not depend on gods, or whose gods are pantheistic and identified with the order of things, because, seeking to solve the problem of the world by escaping from it, they do not depend for help on any power that rules the world. Of this Buddhism is one type and Neo-platonism another. (4) Religions of monotheistic tendency and ethical dualism, which, having realized the organization of good and evil in the world, seek to secure a higher life by faith that the power of light must ultimately prevail over the powers of darkness. The typical example is Zoroastrianism, but the later Greek religion also belonged to it. (5) Religions of true monotheism and reconciliation, which secure the spiritual life by making it the one eternal purpose, and by faith in the one God who works through all things for it. To it belong especially prophetic Judaism and Christianity.

Psychology of Religion

The second study, the psychology of religion, deals with the origin and working of religion in the mind. From the time of the ancient Greeks, religion has been explained away as fear, or vanity, or the fashioning of the world according to our desires. Modern psychology has to acknowledge it an original and fundamental element of human nature, but many studies, especially from France and America, deal with matters like a pre-logical stage of mind, conversion, mysticism, social and mass religious ideas, still with the purpose of explaining religion on purely mental grounds without any external reality to which it corresponds.

Thus Durkheim ascribes to it all social progress and even the development of reason, but, though the sacred is thus eminently useful, it is apparently a mere social device without sanction from the nature of things; and Leuba regards it as an aspect of the will to live, encouraging us in our task of

managing the world by the imagination of beings like ourselves ruling behind its blind forces. Without the sense of sacred obligation above convenience, reason and social order and a victorious freedom in life could hardly have been achieved. But, if illusion works better than reality, we have not even a pragmatic basis for truth. A more serious psychology has sought to find the essence of religion in some aspect of mind—Kant in will, as the assurance of the moral order; Hegel in intellect, as popular philosophy; Schleiermacher in feeling, as artistic intuition of the whole in all things.

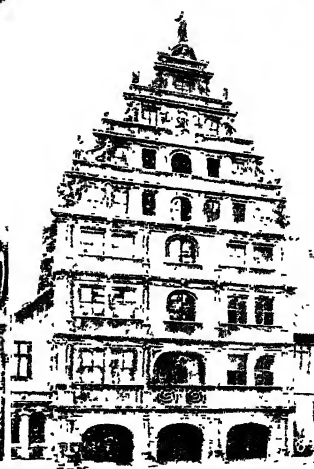
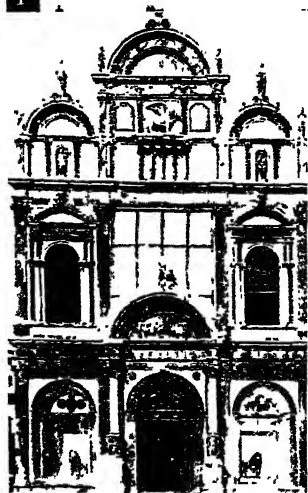
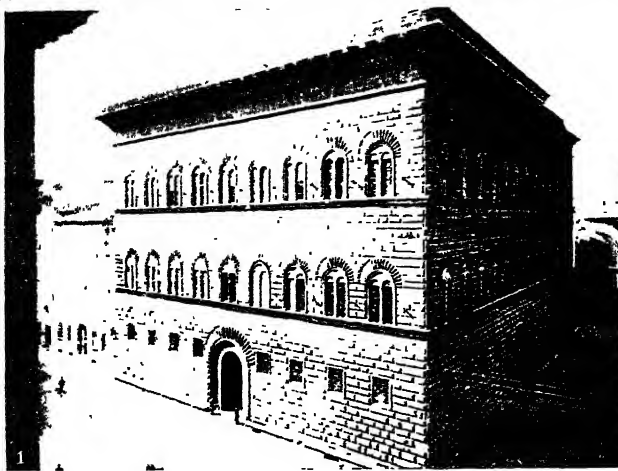
Later Interpretations

Kant is nearest the reality, but, as the values of religion also concern truth and beauty, later writers, like Dr. Inge, seek it in a harmony of all our powers. But no religious person is concerned to maintain this balance of self-culture. His interest in what is sacred is purely as he believes it to be concerned with an absolute and eternal worth in man, which corresponds with the ultimate meaning of the world. The psychology of religion is only an extension of the ordinary psychology of mind. It is an empirical science, dealing with observed facts of mind, without going on to speculate about the nature of reality. But it does not deal with mind as if mind were all.

The metaphysics of religion has to do with the higher world of spirit and our way of knowing it, being also simply an extension of the ordinary metaphysics of experience. This does not mean that all theology is philosophical abstraction, or that faith must be determined by philosophical demonstration, or that the spiritual values which have required great prophetic souls and the long process of history can be produced by philosophical argument from the individual mind. On the contrary, it is the business of this study to justify for religion its own way of knowing its realities. Especially it must show how the question of God means the reality of the absolute claim of all that is of final worth in man and all that he holds sacred in life.

J. W. OMAN

GREAT RELIGIONS OF THE WORLD. The word *heathen*, as used on the map, comprises those primitive peoples whose attitude to the supernatural may be comprehended under the general term *magico-religious*. It is to be preferred to *animist* because animism does not cover all forms of primitive belief. Some of them were pre-animistic, some tend to pass into



1. Strozzi Palace, Florence, 1489-1536. 2. Fava Palace, Bologna, 15th century. 3. Scuola di S. Marco, Venice, rebuilt 1485-95. 4. Dome of S. Peter's, Rome, designed by Michelangelo and completed in 1606. 5. Old

Library, Piazzetta, Venice, 1536-53. 6. Entrance to the Pavillon Sully, Louvre, Paris, early 17th century. 7. West front and main entrance of S. Paul's Cathedral, London, 1710. 8. Façade of Cloth Hall, Brunswick, 1591

RENAISSANCE : EXAMPLES OF THE STYLE OF ARCHITECTURE WHICH SUCCEEDED THE GOTHIC

polydaemonism, if not into polytheism. All may be regarded as representing steps by which the religious idea advanced from the contemplation of nature to the recognition of the supreme power behind. They include such specialised aspects as the fetishism of W. Africa, the nature-worship of aboriginal America and Australia, and the shamanism of N. Asia. They possess two characteristics in common; they are non-ethical, and are not founded on a law or scripture.

Outside the pale of heathendom thus defined lie the world's great ethical religions. The oldest of them is Judaism, the national monotheism of the Jewish people, remarkable for the fact that, cradled in W. Asia, it is now disseminated by racial dispersion over almost the whole earth.

Side by side with this outcome of the Semitic spirit arose in a later age, out of the personalised polytheism of Vedic India, the great system of Brahmanism, which still penetrates the religious and social life of Hindustan. Nowadays this term, properly denoting the ancient Brahma-worship, offered through the priestly offices of the Brahman caste, loosely embraces also many later and diverse sects which are preferably classed as Hinduism. This comprises such developments as Saktism, Lingayatism, and Sikhism, as well as the widespread popular religions which, especially among the aboriginal villagers of S. India, are suffused with animistic practices and with survivals of primitive nature-worships.

In the 6th century B.C. arose the reform founded by Gautama Buddha. Dominant in India for many centuries, it has long been submerged in its homeland by modern Hinduism. The first great missionary faith, it prevails today in Ceylon, Burma, Siam, China, and Korea. In the form of Lamaism, which has absorbed both animist and Hindu elements, it is found in Tibet and Mongolia. In Japan it has profoundly affected Shintoism, a nationalistic cult that was originally a local development of animism.

While the Buddha was spreading his teaching in N. India, Confucius was preaching an ethical philosophy of an altruistic cast in China, and his contemporary Lao-tse was promulgating those views which were ultimately to develop into Taoism. China's state religion recognizes the supremacy of Confucius, but in the popular mind religion and its ritual of ancestor-worship have been much affected by the influence of Buddhism, while modern Taoism is a polytheism with much primitive animism. Christianity, the supreme faith of mankind, stands alone both in the ethical and in the spiritual sphere, in the number of its adherents, and in the universality of its appeal.

The latest of the great religions is Islam. Founded in the 7th century A.D. by Mahomet, it embodies Jewish and Christian elements, but from the outset manifested marked hostility to both. From its Arabian cradleland it spread over N. Africa in one direction, into Persia, India, and central Asia in another, besides following the path of Arab migration into Malaysia and modern negro Africa.

E. G. Harmer

The following table gives approximately the numbers of adherents of the chief religions:

RELIGIONS OF THE WORLD: APPROXIMATE FIGURES

CHRISTIANS :		
Roman Catholics ..	331,500,000	
Orthodox Catholics ..	144,000,000	
Protestant ..	206,900,000	
Coptic Christians ..	10,000,000	
		692,400,000
NON-CHRISTIANS :		
Jews ..	15,900,000	
Muslims ..	210,000,000	
Buddhists ..	150,180,000	
Hindus ..	230,150,000	
Confucians and		
Taoists ..	350,600,000	
Shintoists ..	25,000,000	
Animists, etc. ..	135,650,000	
Unclassified ..	50,870,000	
		1,168,350,000
		1,860,750,000

Bibliography. Introduction to the History of Religion, F. B. Jevons, 1904; The Evolution of Religion, L. R. Farnell, 1905; The Threshold of Religion, R. R. Marett, 1909; The Golden Bough (1911-15), Belief in Immortality (1913), Folklore in the O.T. (1919), Worship of Nature (1926), all J. G. Frazer; The Study of Religion, S. A. Cook, 1914; History of Religion, 2 vols. (1914, 1920), The Growth of Religion, 1923, both G. F. Moore; Encyclopedia of Religion and Ethics, art. M. A. Canney, 1921; Primitive Religion, R. H. Lowie, 1925; Our Knowledge of God, J. Baillie, 1939; The Religious Pros-

pect, V. A. Demant, 1939; *Varieties of N.T. Religion*, E. E. Scott, 1946; *Religious Ideas of the O.T.*, H. W. Robinson, 1947; *Ethics of the Great Religions*, E. R. Pike, 1948.

Religious Tract Society. British society founded in 1799 and now part of the United Society for Christian Literature (*q.v.*).

Remagen. Town of W. Germany, in Rhineland-Palatinate. On the site of the Roman Rigmagus, it is on the left bank of the Rhine, 23 m. N.W. of Coblenz. The rly. junction for Wiesbaden, it has a small distilling industry. Here during the Second Great War the Allies made their first crossing of the Rhine, the U.S. 9th armoured div. coming unexpectedly at Remagen, March 8, 1945, on the only bridge across the Rhine intact, the Ludendorff rly. bridge. A lieutenant, on his own initiative, rushed the bridge, surprising and overrunning a German demolition party. No major operation was effected from the bridgehead so gained, but the potential threat forced a dispersal of German reserves. The bridge collapsed March 17, but by then several temporary bridges had been built. Remagen came within the French zone of occupation. Pop. 7,000.

Remainder. Term used in English real property law. The law about remainders is very technical. When a particular estate of freehold is granted to a person, with remainder to another, it means that the latter is to take the property when the particular estate determines. An illustration will make this more clear. X is the owner of Blackacre. He grants or devises it to A for life (particular estate) with remainder to B in fee. B takes on A's death; and even if B dies before A, B's heirs take.

A contingent remainder is one limited to take effect on the happening of an event or the fulfilment of a condition which may or may not happen until after the determination of the particular estate. As when X leaves his property to his widow for her life, and after her death to his son John if he shall then have attained (or on his attaining) 21 years of age in fee. Since 1925 remainders cannot exist as legal estates; but future interests having all the characteristics of remainders may be created as equitable interests.

Remand (Lat. *remandare*, to order back). In law, the adjournment by a criminal court of the hearing of a charge against an accused person. The prisoner may be either retained in custody or

admitted to bail. A remand in custody, if by verbal order, must not be for more than three days; if on a written warrant, it should not exceed eight clear days. Children under 17 are remanded, not to prison, but to remand homes specially provided. See Trial.

Remand Home. Institution in the U.K. to which children and young people waiting on remand for a decision of the court can be sent. Until the passing of the Children's Act, 1908, children and young persons on remand or awaiting trial by the courts were sent to prison. The 1908 Act provided for special places of detention for young persons. These, however, were the responsibility of the police authorities and tended to be punitive in atmosphere. The Children and Young Persons Act, 1933, made it the duty of every county and county borough to provide remand home accommodation, either alone or jointly with a neighbouring authority. It also empowered local authorities to use homes run by voluntary bodies provided they were inspected by the Home office and run according to Home office rules. Responsibility for running remand homes is vested in the local education authority. In 1950 there were 51 remand homes for boys, 31 for girls, and 3 mixed homes.

Remand homes were intended primarily to shelter children committed to them by the courts on remand. Many children are committed to them for the purpose of obtaining medical and psychological reports to assist the juvenile court in reaching a decision as to the child's future.

Remand homes may also be used (a) as "places of safety": under section 67 of the 1933 Act, a child in need of care and protection may be sent to a remand home temporarily; the Curtis committee, 1945, recommended that this should be for not more than 14 days; (b) for children committed to the care of the local authority and awaiting boarding-out; (c) for the detention of boys and girls awaiting admission to approved schools; (d) as places of "punitive detention": section 54 of the 1933 Act empowers a court to order the detention of an unruly child in a remand home for a period not exceeding one month; (e) as places of detention for absconders from approved schools.

Remand homes are used for children over 8 (the youngest age at which they are considered in law to be criminally responsible),

and for young persons up to 17. Occasionally younger children in need of care and protection are admitted temporarily. Remand homes must be equipped so that the period children spend in them can be used constructively, but their population is so mixed and rapidly changing that it is difficult to provide satisfactory educational and recreational facilities.

Remarque, ERICH MARIA (b. 1898). German-born American novelist. Born at Osnabrück, his real name being Kramer, he left school young and went into the army, fighting in the First Great War. His first novel, *All Quiet on the Western Front*, 1929, a bitter and disillusioned picture of modern war, created a sensation and was translated into many languages. Later books, *The Road Back*, 1931; *Three Comrades*, 1937; *Flotsam*, 1941; *The Arch of Triumph*, 1946, were not so successful, but continued his picture of a world of violence and irrationality. He lived in Switzerland from 1929 to 1940, and then went to the U.S.A., becoming an American citizen. He had already, in 1938, been deprived of his German citizenship by the Nazis.

Rembang. Seaport of Java, Indonesia. It is on the N. coast, 50 m. E.N.E. of Samarang by rly. Sugar cane, teak, and petroleum are obtained from the surrounding district, which formerly constituted a Dutch residency. Rembang was heavily raided from the air on Feb. 5, 1942, and fell to the Japanese on March 3. It was liberated when Australian troops landed in Java in July, 1945.

Rembrandt (1606-69). Dutch painter, whose full name was Rembrandt Harmensz van Ryn (or Rijn). Son of a miller, Rembrandt was born at Leyden, July 15, 1606, and was apprenticed to a local painter named van Swanenborch. He studied at Amsterdam under Pieter Lastman, but his preference for independent observation and methods of work brought him back to Leyden in 1624. Several paintings and many etchings showed that he strengthened his command of drawing and the use of oils between that date and 1631, when, with a growing reputation, he settled in Amsterdam. His fame was firmly established by the *Anatomy Lesson*, now at The Hague, which he painted on commission in 1632. In 1634 he married Saskia van Vlyenborch (d. 1642), a Frisian, whom he portrayed in various paintings and drawings.

Commissions and pupils increased in numbers, and among the productions of prosperous years were *The Bride of Tobias* (Hermitage, Leningrad), 1636; *The Angel leaving Tobias* (Louvre), 1637; *The Marriage of Samson* (Dresden), 1638; and the self-portrait now in the National Gallery, London, 1640. In 1640 came *The Canal*, first of Rembrandt's landscape etchings from nature; *The Windmill* etching following in 1641.

After the completion in 1642 of the great painting generally called *The Night Watch* (Amsterdam), a corporation painting for the Amsterdam Civic Guard, Rembrandt's fortunes seemed to be crossed. His expensive style of living and



Rembrandt
Self-portrait

natural generosity diminished his quickly made fortune, and rapidly mounting debts led to his being declared bankrupt in 1656, when his valuable private collection of works of art was sold up for the small sum of 5,000 florins. But his powers remained undiminished, and these last years of misfortune saw some of his finest works, among them *The Adoration of the Magi* (Buckingham Palace), 1657; a fine self-portrait (Munich), 1658; and the well-known *Syndics of the Guild of Drapers* (Amsterdam), 1661. In 1662 died Hendrikje Stoffels, his mistress faithful in misfortune, whom he probably married after 1656. The master himself died in poverty at Amsterdam, and was buried in the Westerkerk, Oct. 8, 1669.

Rembrandt's development as a painter shows three main periods. In his first manner, influenced by his masters, he is tentative, dwelling with care upon detail, but early

showing individuality by his use of a full light upon his centre of interest. The Philosopher, about 1630 (National Gallery), shows well the qualities that were later to develop. After a few years in Amsterdam, his second period, about 1635-42, shows a freer expression of personality. Detail is abandoned for bold, solid strokes of the brush; conception and treatment of subjects are broader; the characteristic tones of gold and brown are freely used; and great dramatic force is given by his contrasted effects of light and shadow.

In his third phase, 1642-69, we find Rembrandt making even fuller use of his discovery of the power of chiaroscuro, delighting in massive effects of dark shadow built up of rich sombre colours, and bringing into his schemes a peculiar deep glowing red. These "Rembrandt-*esque*" qualities have profoundly influenced the character of painting. He must be ranked among the greatest artists who ever lived, and in the portrayal of old men has scarcely an equal.

In the history of etching Rembrandt stands pre-eminent also. Controversy has been keen as to the genuineness of all the plates ascribed to him, but he can safely be credited with about 290, and, like his paintings, these have had great artistic influence. Broadly his etching developed along lines parallel with his painting. After about 1640 he passed from detail to use of the dry-point to stress his light and shadow effects, well seen in *The Three Trees*, 1643, and after 1650 shows a wonderful mastery over the whole tone of his plates, memorable among which are *Christ with the Sick around Him* (the "Hundred Guilders Print"); *Christ Appearing to the Disciples*, 1650; *Christ between His Parents*, 1654. See *Abraham illus.*; *Dutch School of Painting*; *Etching*. *Jesus illus.*; *Painting*.

Bibliography Rembrandt, H. Knackfuss, Eng. trans. 1899; *Etchings of R. P. G. Hamerton*, 1905; Rembrandt, J. B. Manson, 1923; R. and His School, J. C. Van Dyke, 1923; Rembrandt, A. M. Hind, 1938; Rembrandt, H. W. van Loon, 1943; *Selected Paintings of R.*, Phaidon Press, 1943.

Remembrance Day. Day which in Great Britain after the Second Great War replaced Armistice Day (*q.v.*) as the occasion for remembering those who lost their lives in the two Great Wars. It was fixed as the Sunday preceding Nov. 11, or on Nov. 11 or 12 if either of those days happened to fall on a Sunday

Remembrancer. Title formerly held by certain clerks of the English exchequer. The king's remembrancer, with whose office that of lord treasurer's remembrancer was amalgamated in 1833, was an officer who "reminded" the judge and kept certain records. He is now head of a department of the central office of the supreme court. In London the city remembrancer is an officer who watches the legislative interests of the corporation.

Remington, PHILIP (1816-89). American manufacturer and inventor. Born at Litchfield, N.Y., he became one of the controlling heads of his father's small-arms factory. He was the inventor of the breech-loading rifle which bears his name, and in 1873 was one of the first to construct a practical typewriter. The Remington rifle was adopted by several European governments, and supplied to the Federal government during the Civil War.

Remiremont. Town of France. It stands on the left bank of the Moselle in the dept. of Vosges, 13 m. S.E. of Epinal. The manufactures include cotton, hosiery, and boots and shoes. The chief building is the abbey church, mainly of the 14th century. The palace of the abbess was made into the municipal headquarters, and was rebuilt on the original plan in the 19th century, but some houses of the canonesses remain.

The town was founded about 800, and about 1100 the nuns from an abbey, founded on a hill near by S. Romaric, removed here, and their house soon became wealthy and famous. The abbess, who was strong enough in the 16th century to carry on a war with the duke of Lorraine, was a princess of the empire, and the 50 canonesses were all of noble birth. The house was suppressed at the Revolution.

In the Second Great War severe fighting occurred in the neighbourhood during mid-Sept.-mid-Nov., 1944, the Germans offering fierce resistance in the Vosges hills to the advancing French and U.S. forces. Long part of Lorraine, it was joined to France in 1786. Pop. 10,319.

Remonstrants. Calvinist sect of the Netherlands led by Arminius (*q.v.*) and deriving its name from a remonstrance addressed 1610 to the states of Holland denying any intention of stirring up disputes in the church. Favoured by Barneveldt, they were opposed by Prince Maurice who had them proscribed. 1617. but

were treated with more toleration after Maurice's death, 1625.

Remote Control. Method of controlling a mechanism from a distance by electrically operated devices. One such device is breaking the beam from a photo-electric cell and so giving the initial impulse to mechanism which opens doors or stops machinery in an emergency. Radio waves help to land aircraft in fog, while the automatic pilot keeps aircraft on a fixed course. Electromagnetic gear is used for the remote control of electric motors from a central point. Automatic telephones and lifts, and the automatic signalling and shunting equipment on railways, involve this principle. Many street lighting systems are fitted with photo-electric remote control gear which turns on or switches off the lamps according to the degree of natural light. See *Automatic Pilot*; *Photo-electric Cell*; *Radio Control*; *Relay*.

Remscheid. City of W. Germany in N. Rhine-Westphalia, 20 m. N.N.E. of Cologne. A big industrial centre, it lies amidst wooded hills, at 1,200 ft. alt., on a main rly. It possessed fine old houses of the baroque and rococo period, and there have been forges and tool-making shops since the 11th century; others were set up by Huguenot and Dutch emigrants in the 17th century. The centre of German tool making, Remscheid also produced skates, household machinery, and steel goods. It had the oldest German dam, the Eschbach-Talsperre (1891); the highest bridge, at the suburb of Müngsten, 350 ft. high and 1,660 ft. long; a museum and monument devoted to Röntgen, discoverer of X-rays, who was born near; and a town hall in Renaissance style, built 1906-09. In the former Rhine prov., it lay within the Ruhr pocket of resistance in April, 1945. After the end of the war it came within the British zone of occupation. Pop. (1950) 96,000.

Remsen, IRA (1846-1927). American chemist. Born Feb. 10, 1846, in N.Y.C., he was educated there and at German universities, where he went on to do research in pure chemistry. He taught that subject at Williams College, 1872-76, and from 1876 was at Johns Hopkins university, being professor of chemistry and director of laboratories, secretary of council, and during 1901-13 president. Founder in 1879 of the American Chemical Journal, he described therein a compound he had (with

Fahlberg) discovered, soon widely known as saccharin. His textbooks were standard works and widely translated. He died March 5, 1927.

Remus. Twin brother of Romulus, the legendary founder of Rome. See Romulus.

Rémusat, CHARLES FRANÇOIS MARIE, COMTE DE (1797-1875). French philosopher and statesman. Born in Paris, March 14, 1797, the son of Auguste Laurent, comte de Rémusat (1762-1823), one of Napoleon's chamberlains, he studied law, and soon published political and critical articles. Influenced by Guizot, he became a deputy, 1830, and was minister of the interior

under Thiers, 1840. His works include *Essais de Philosophie*, 1842; *Sur la Philosophie Allemande*, 1845; *Abélard*, 1845; *S. Anselme*, 1852; *L'Histoire de la Philosophie Anglaise depuis Bacon à Locke*, 1875. Admitted to the Académie Française, 1846, he was exiled by Napoleon III, 1851-59, but held the foreign office again during the premiership of Favre 1871-73. He died in Paris, June 6, 1875.



Comte de Rémusat.
French philosopher

artistic and literary centre. There the two greatest of the Medici, Cosimo (1389-1464) and his grandson Lorenzo the Magnificent (1448-1492) used the wealth acquired by shrewd international banking to subsidise and encourage scholars, painters, sculptors, and architects, Lorenzo, in particular, gathering round him a band whose learned discussions emulated those of Plato's Academy. The revival of the spirit of ancient Athens which permeated 15th cent. Florence is perhaps best illustrated by the great competition for the design of the gilded doors of the Baptistery, commissioned by the city in 1400 after the departure of the plague. The greatest talent in Italy flocked to compete, and when Donatello, Brunelleschi, and the others saw Ghiberti's model designs they unanimously praised the judges to give him the prize.

Florence's Contribution

In this spirit and against a background of ceaseless political experiment Florence produced an art which can be set against that of any other period in modern history. Cimabue (1240-1300) first led the breakaway in painting from the stiff Byzantine tradition; his pupil Giotto (1276-1336) carried it on as painter, sculptor, and architect, leaving the cathedral tower of Florence as, perhaps, his greatest masterpiece; and from then onwards there was a continuous succession of great names, and an unbroken line from Machiavelli of great historians to chronicle their achievements, until the movement reached its climax in Raphael, Michelangelo, and Leonardo da Vinci, who were all producing their greatest work at the beginning of the 16th cent. Every city in Italy could boast a history similar to, though less distinguished than, that of Florence.

Under the papacy of the Medici Leo X (1513-1521) supremacy passed again to Rome, where Raphael and Michelangelo did much of their greatest work. But the sack of Rome in 1527 and the capture of Florence by Charles V in 1530 put an end to the period of great art, except in Venice, where a splendid tradition in all the arts reached its climax only in the 16th cent. with Titian (1477-1576) and Tintoretto (1512-1594).

The Italian Renaissance sprang in essence from a new approach to the natural world and so ultimately involved every kind of human activity. To Leonardo da Vinci the arts which he practised were only part of a ceaseless study

THE RENAISSANCE

W. L. McElwee, author of *The Reign of Charles V*

In connexion with this article, see the biographies of the scholars of the Renaissance, e.g. Colet; Dante; Erasmus; More; Petrarch; and those of the painters of the period. See also Architecture; Art; Humanism; the histories of the various countries, England; France Italy; etc., and the article Reformation

The Renaissance (Fr. *re*, again; *naître*, to be born) was the whole process whereby Europe passed from a medieval to a modern civilization: "the fructifying of the human mind through contact with the classical world of Greece and Rome." Obviously such a change cannot be accurately dated. Historians have traced its first beginnings to the time of Charlemagne and its further progress through the so-called Ottonian Renaissance of the 10th cent. and the 12th cent Renaissance, while medieval habits of mind survived here and there well into the 17th cent. It was the "revival of learning," and especially of the study of Greek, which first weakened the rigid conventions of the Middle Ages; and in consequence the fall of Constantinople in 1453 and the invention of printing in 1440 have each been chosen as the decisive event marking the transition. But Manuel Chrysoloras was teaching Greek in Florence in 1396, and three famous scholars taught Greek in Padua alone between 1420 and 1430. In fact there were plenty of itinerant teachers of Greek in Italy before the influx of refugees from Constantinople, and the collection, translation, and copying of ancient manuscripts had already spread the knowledge of Greek and Latin literature throughout Europe and built up great libraries like those of Pope Nicholas V and Cosimo de' Medici before printing made the spread of knowledge so much easier and swifter

The revival in a secular and humanistic spirit of the study of ancient authors at first became in Italy an attempt to recreate the glories of ancient Rome. Dante looked forward to a revived Holy Roman Empire and Petrarch (1306-1374) wrote his Letters in a style intended to rival that of Cicero; while scholars like Poggio Bracciolini (1380-1459) grubbed in monastery cellars and libraries for the lost masterpieces of antiquity. Thus, though the tales of Boccaccio (1313-1375) pointed the way to a new, light, essentially secular and vernacular literature for a century or so the full development of the movement was hindered by pedantry and antiquarianism. Rome naturally became the first centre of the revival, especially when Pope Nicholas V boldly decided to harness in the church's service the new forces which indirectly threatened many of the traditions on which papal supremacy rested. He became one of the first great Renaissance patrons, paying, for example, 500 ducats for a translation of Thucydides by Lorenzo Valla, who had narrowly escaped the Inquisition when he exposed the forgery of the Donation of Constantine: and he succeeded in diverting some of the impetus of the new learning into the study of early Christian Greek writings and the rediscovery of Christian as well as of pagan antiquity

Throughout the 15th cent. however, Florence rivalled and for a time outshone even Rome as an

of all natural phenomena. He worked as a military and civil engineer, an irrigation expert and a town planner, he designed engines of war and projected a flying machine. Such an attitude of mind left no definable frontier between art and science, and led inevitably to a revival and complete reform of scientific study. Titian was employed to illustrate Vesalius's textbook of anatomy. The study of ancient geographers led to the discoveries of Vasco da Gama and the Portuguese, Columbus and the Spanish conquistadores; and most of the Renaissance energy of Spain and Portugal was diverted into the exploitation of these. Thus the experiments and achievements in astronomy, mathematics, and physics of Copernicus, Galileo, and Newton, and the medical discoveries of Harvey must be regarded as the culmination of the revival of learning. Another inevitable consequence was a wholly new outlook on education, evolved by men like Vittoriano da Feltré, who conducted a celebrated academy for the sons of the nobility at Mantua, and most lastingly embodied in the English public schools.

Renaissance Politics

In politics and religion the results of the new movement were as far-reaching, but less easy to trace and define. Purely political forces were already at work to destroy the medieval conception of a united Christendom before the humanistic preoccupation with individual rights and capacities came to strengthen national prides and antipathies which divided Europe into self-conscious nation states and substituted the realistic outlook associated with Machiavelli's Prince for the idealism of the Middle Ages. Similarly, the Reformation cannot be described as a direct consequence of the Renaissance, though the new spirit of limitless inquiry and criticism and the passion for scientific accuracy undoubtedly fostered a habit of mind which facilitated the attack on the church's established institutions and hampered the papacy's defence.

The movement thus started in Italy found its clearest echo in France. Racially more akin to the Italians than other nations and more directly linked than most to the civilization of ancient Rome, the French set themselves to imitate the Italian achievement—a tendency enormously stimulated by the Italian wars of Charles VIII

Louis XII, and Francis I between 1494 and 1546. The poets of the Pléiade, of whom Ronsard (1524–1585) was the one great creative genius, deliberately set themselves to remould and perfect the French language on the basis of a close study of the classics. The real Renaissance spirit—the adventurousness and the great appetite for life—were to be found at their best in Rabelais (1500–1553). But he was not typical of the French Renaissance, which became rather an elegant adaptation of the achievements of the Italian city states to the taste of the monarchical and aristocratic society of France. Thus the court painters, such as Clouet, and the architects, decorators, and landscape gardeners of the great châteaux were the more characteristic products of the new movement, though in the world of scholarship men like Budé and the younger Scaliger followed in the authentic tradition of the Italian humanists.

German Humanism

There were already discernible beginnings of the humanistic outlook in Germany when Rölöt Huysmann, surnamed Agricola, first carried "out of Italy a breath of the higher culture," and the German Renaissance quickly diverged again from the Italian tradition. A greater preoccupation with the more serious side of life, with religion rather than with pagan antiquity, with matter rather than with form, with content rather than style, marked the work of the great 16th cent. German scholars like Reuchlin and Melancthon, and the wandering Flemish scholar, Erasmus, who was closely linked with them and greatly influenced the early development of Luther. Though their classical scholarship was sound the German tradition had always tended to be anti-Roman and, since the Roman remains in Germany were much slighter than those which stimulated the Italians to imitate antiquity, the Germans were more concerned with the current abuses in church and papacy than with the glories of the Roman empire. In the Augsburg created by the banking wealth of the Fugger (*q.v.*) family, and in the great industrial and commercial cities of the Netherlands, leisure and wealth in the latter half of the 15th cent. produced an artistic revival almost rivalling that of Florence. From the first, however, the classical influence of the new learning on the N. European Renaissance was subdued by the

pietism emanating from the Netherlands. In consequence the movement was early and easily diverted into an anti-papal crusade when Luther launched the Reformation, and German humanism, along with the artistic revival which produced Dürer and Cranach, was swamped in religious controversy.

Influences in England

In England, too, there was the tendency to adapt the learning that came from Italy to a native tradition and to preserve far more than the Italians of the medieval outlook. Linacre and Grocyn taught at Oxford what they had learnt in the universities of N. Italy, but their pupils, More and Colet, remained essentially conservative and orthodox. Like Erasmus, who was their great friend, they combined real scholarship and minds highly critical of current abuses in church and state with loyalty to established forms and institutions. The influence of such men on the English Reformation was only indirect, and it was through their educational reforms and their new schools that they made their most substantial contribution to the real English Renaissance, which achieved its greatest triumphs in Elizabethan literature, in the poetry of Spenser and the plays of Shakespeare, and in the music of Purcell and Orlando Gibbons.

Politically as well as culturally the history of Western Europe—and derivatively of much of the rest of the world—has since been concerned in the working out of the ideas, discoveries, and habits of thought to which the Renaissance gave the first impulse and, though there are signs now that the emphasis on the individual, his capacities, and his rights, which was the essence of humanism, is giving way to new conceptions of society and of man's place in it, it may be that the impetus of the Renaissance is not yet wholly exhausted.

Bibliography. *The Life and Times of Machiavelli*, P. Villari, Eng. trans. 1892, freq. reprinted; *The Later R.*, D. Hannay, 1898; *The Earlier R.*, G. Saintsbury, 1901; *The Italian R. in England*, L. Einstein, 1902; *Cambridge Modern History*, vol. 1, *The R.*, 1903; *The French R. in England*, S. Lee, 1910; *The R. in Italy, France and England*, F. M. Simpson, 1912; *The Story of the R.*, W. H. Hudson, 1912; *The R. and the Reformation*, E. M. Tanner, 1915; *The R. in Italy*, 7 vols., J. A. Symonds, 3rd ed., repr. 1923; *The Political Thought of the Sixteenth Century*, J. W. Allen, 1928; *The Civilisation*

of the R. in Italy, J. Burckhardt, Eng. trans., 15th ed., 1929; *The Mind of Leonardo da Vinci*, E. McCurdy, 1929; *The R.*, E. F. Jacob, 1930; *Sociology of the Renaissance*, A. von Martin, 1945; *The Renaissance*, J. Atkins, 1947.

Renaix (Flemish *Ronse*). Town of Belgium, in the prov. of E. Flanders. It lies in hilly country, 26 m. by rly. S. of Ghent, and is a rly. junction of importance. There are industries in cottons, woollens, bootmaking, brewing, and trade in local agricultural produce. The town is pleasantly situated and is a summer resort. The 11th century church of S. Hermès, built in the Romanesque style, has a fine crypt. Pop. 25,433.

Renan, JOSEPH ERNEST (1823-92). French philosopher and philologist. Born at Tréguier, Brittany,



J. Renan

After Bonnat

Feb. 27, 1823, and educated for the priesthood, he left the seminary of S. Sulpice in 1845, diverted from the theology by the scholastic methods of the time, and devoted himself, with the assistance of his sister Henriette, to the study of letters, and especially to the study of Oriental languages. For a time he was assistant master in a boys' school. In 1850 he secured an appointment at the Bibliothèque Nationale, Paris, and visited Italy. In 1852 came his work on Arabian philosophy, *Averroès et l'Averroïsme*, followed by his *Histoire Générale des Langues Sémitiques*, 1854, *Études d'Histoire Religieuse*, 1856, and *Essais de Morale et de Critique*, 1859.

One of a commission sent by the French government in 1860 to Phoenicia and Palestine, his appointment, 1861, to the professorship of Hebrew at the Collège de France, owing to clerical opposition, was not ratified until 1870. In the meantime he lost by death his sister, Henriette, whose devotion he commemorated in *Ma Soeur Henriette*, 1895 (Eng. trans. Brother and Sister, 1896), and published his best-known work, *Vie de Jésus*, 1863. Most of this work, which formed the initial volume of his *Histoire des Origines du Christianisme*, was written during his visit to Syria. The other volumes of the series deal with Christianity down to the time of Marcus Aurelius.

Renan's other works are *L'Histoire du Peuple d'Israel*, 1888-94; *Dialogues Philosophiques*, 1876; *Drames Philosophiques*, 1888; and *L'Avenir de la Science*, a work of 1878 first issued in 1890. In 1878 he was elected to the Academy; in 1880 he delivered in London the Hibbert lectures on *The Influence of Rome on Christianity*. He married in 1856 a daughter of Ary Scheffer, who died in 1894. Given the cross of the Legion of Honour in 1880, he was made a grand officier in 1888. He died Oct. 2, 1892, and was buried at Montmartre. A statue to his memory, by Boucher, was erected by the French government at Tréguier, in 1903, much against the wishes of the R.C.s of the town.

An emotional romantic, who repudiated the charge of atheism, whose Life of Jesus pained the orthodox believer, and whose *L'Abbesse de Jouarre* was described as an attempt to raise sensuality to the rank of religion, Renan was the greatest French prose writer of his time, and a scholar whose sympathies were as universal as his knowledge was extraordinarily wide, if somewhat lacking in depth. As a philosopher he took up an attitude of somewhat superior, even ironical, detachment, slurred over rather than faced difficulties, and, especially in his later years, was prone to a good-natured acceptance of things as they are. It was said of him that he thought like a man, felt like a woman, and acted like a child. His conversation had all the fascination of his style, which, while vivid and picturesque, is classic in clarity and simplicity.

Bibliography. Poetry of the Celtic Races and other Studies, Eng. trans. W. G. Hutchison, 1896; *Life of Jesus*, Eng. trans. W. G. Hutchison, 1897; *Lives*, M. Grant Duff, 1893; W. F. Barry, 1905; L. F. Mott, 1921; J. M. Robertson, 1924.

Renault, LOUIS (1877-1944). French engineer. Born in Paris, Feb. 12, 1877, he served an apprenticeship in engineering and became one of the pioneers of motor car design. In 1898 he introduced the now universal practice of having a driving-shaft to couple the engine with the back axle of a motor vehicle. Two years later he founded the firm of Renault Brothers, one of the first large-scale builders of cars. In 1905 he introduced taxis in Paris, and in 1907 designed and built the first efficient air-cooled aero engine. Later he designed armoured fighting vehicles, and the 70-ton Renault tank

was the heaviest vehicle of this class in service with any army at the outbreak of the Second Great War. Renault died Oct. 25, 1944, while awaiting trial for collaboration with the Germans. The Renault plant was nationalised 1945.

Rendsburg. Town of Slesvig-Holstein, Germany. It is 18 m. W. of Kiel, on the Kiel Canal. Called Reinoldesburg in the 12th cent., it became a town in 1339. From 1539 to 1852 it was a strong fortress, and later developed into a rly. junction and an inland port. The Gothic church of S. Mary (1297) and the town hall (1566) are the main buildings. The town was one of the bases of Slesvig-Holstein forces in the war against Denmark, 1848-50. It was little damaged in the Second Great War, and after the surrender of Germany came within the British zone of occupation. Pop. (1950) 36,000

René (1409-80). Duke of Anjou, called the Good. Son of Louis II of Anjou, he was born at Angers, Jan. 16, 1409, and married in 1420 Isabella of Lorraine, whose uncle, disputing the inheritance, captured René at Bulgnéville, 1431. In 1434 René inherited Anjou and Provence, and proved a popular ruler, occupying himself with the arts and literature of his domains and fostering their agriculture, etc. He handed the succession of Aragon to his son John of Calabria (d. 1470), but Louis XI persuaded him, 1474, to bequeath his dominions to Charles of Maine, so that Anjou should revert to the French crown. He died July 10, 1480, leaving poems, romances, and other writings of considerable merit. His daughter Margaret married Henry VI of England, 1445.

Renegade (Span. *renegado*, cf. runagate). One who deserts his principles, more especially one who apostatises from his faith from other than conscientious motives. The word was first used of Christians who embraced Mahomedanism to avoid persecution.

Renfrew. Royal and municipal burgh and the county town of Renfrewshire, Scotland. It stands on



Renfrew arms

the left bank of the river Clyde, 5 m. by rly. W. of Glasgow, and has an airport. Claiming to be the oldest burgh in Scotland and formerly a considerable Clyde port, it lost much of its importance, but in the 20th century basins and docks which can accommodate the lar-



Renfrew. Town Hall of this Scottish county town

gest vessels were constructed. Castlehill marks the site of the castle of the Stewarts. Shipbuilding is the staple industry, and there are boilermaking and engineering works. Market day, Sat. Pop. est. 17,000.

Renfrew. Town of Ontario, Canada. Situated on the Bonnechere river, 8 m. from its confluence with the Ottawa, it is also on the main lines of the C.P.R. and C.N.R. Chief industries are the making of textiles and machinery. Pop. 5,673.

Renfrewshire. County of Scotland. In the S.W. of the country, it is bounded N. and W. by the Clyde, only a small portion lying N. of that river. Its area is 240 sq. m. The surface is generally undulating except in the S., where there are hills.



Renfrewshire arms

The chief rivers are the Carls, Black and White, tributaries of the Clyde, and Loch Thom is the most important of several lakes. The part that lies along the Clyde is an industrial area; here are Paisley, Greenock, Port Glasgow, Gourrock, and parts of Glasgow. Elsewhere agriculture is carried on. Renfrew is the county town. The co. sends two members to parliament. Renfrewshire was part of the county of Lanark until about 1400. A prince of Wales bears the title of Baron Renfrew. Pop. est. 322,700.

LITERARY ASSOCIATIONS. William Wallace, the great hero of Scottish history and legend, is supposed to have been born at Elderslie, near Paisley. The 16th-17th century Semphills, Sir James, his son Robert and grandson Francis, all

of Beltrees, won distinction as writers, Robert Semphill being credited with reviving the verse stave, of which Burns was later to make great use. Robert Pollok, author of *The Course of Time*, was born at Eaglesham. John Wilson (1720-89), author of a "loco-descriptive poem" on the Clyde, was for 20 years master of the Greenock grammar school. Another native of Paisley of the same name is better known by his pen-name of Christopher North. Robert Tannahill, the weaver poet, was born in Paisley, worked and died there, and a bronze statue to him stands in the Abbey burial ground. Alexander Smith, 1830-67, passed his childhood in Paisley, and wrote of his life there in his autobiographical story, *Alfred Hagart's Household*. At Greenock John Galt lived for many years and is buried. Gourrock was for some years the residence of the novelist Neil Munro. *Consult* Description of the Sheriffdoms of Lanark and Renfrew, W. Hamilton, repr. 1878.

Reni, GUIDO (1675-1642). Italian painter. Born at Calvenzano, Nov. 4, 1575, he studied

under Denis Calvaert, and with the Carracci at Bologna. Later on he came under the influence of Caravaggio, and for some years followed his naturalistic style; his later work, however, is more voluptuous. Many years of his life were passed in Rome, where Pope Paul V befriended him, but his masterpiece, a Nativity, is in the church of S. Martino, Naples, and he ended his career at Bologna, overwhelmed by debts incurred through gam-



Guido Reni, Italian painter

bling. He died Aug. 18, 1642. Guido was a most prolific and facile painter and engraver, and is amply represented in English and other European galleries. *See* Jesus illus., p. 4637.

Renmark. River port in South Australia. It stands on the river Murray, and has regular steamer communication with Morgan, 74 m. W., thence by rail to Adelaide. It is a prosperous centre of co-operative fruitgrowing on irrigated land, and was one of the earliest irrigation colonies.

Rennell. British island of the Pacific Ocean, in the Solomon Is. protectorate, 120 m. S. of Guadalcanal. It is inhabited by Polynesians of a primitive social order.

Rennell, JAMES RENNELL RODD, 1st BARON (1858-1941). British diplomatist. Born Nov. 9, 1858, and educated at Haileybury, and Balliol college, Oxford, he entered the diplomatic service in 1883. Ten years later he was in charge of the British agency at Zanzibar, remaining in Africa until 1901, having been special envoy to Menelik of Abyssinia in 1897, while acting as secretary of legation at Cairo. Councillor of embassy at Rome, 1901, he was British minister at Stockholm during 1904-08, and ambassador to Italy, 1908-19. Knighted in 1899, he was raised to the peerage as Baron Rennell of Rodd in 1933, having been Conservative M.P. for Marylebone during 1928-32. He died July 26, 1941, and was succeeded by his son, Francis James Rennell Rodd (b. Oct. 25, 1895). The first baron's published works included *Social and Diplomatic Memories* (3 vols.); *Customs and Lore of Modern Greece*; and several volumes of verse.

Renner, KARL (b. 1870). Austrian statesman. Born Dec. 14, 1870, he attended Vienna univ.,

entered politics in 1907, and in 1919 headed the Austrian delegation to the peace conference of St. Germain which after the First Great War laid down the frontiers and status of the Austrian republic. He was chancellor during 1919-20. He was elected first president of the Austrian parliament in 1931, but was imprisoned for a



Renfrewshire. The Scottish county mostly S. of the Clyde

time for high treason in 1934, when Dollfuss (*q.v.*) attempted to crush the Socialists. Leader of the Social-Democratic party, he headed the provisional government set up by the Allies at the end of the Second Great War in 1945, later becoming premier of a more representative government. At the end of the year he was elected president.

Rennes. Town of France, capital of the dept. of Ile-et-Vilaine, and of the former province of Brittany. It lies at the confluence of the rivers Ile and Vilaine, 232 m. by rly. W.S.W. of Paris, and is a rly. junction. It is the seat of an archbishop, and the headquarters of an army corps, with large barracks and arsenal. Rennes has a university and a national school of agriculture. The industries include tanning, and there are foundries and textile and printing works; and a trade in agricultural produce and livestock.



Rennes, France. Western facade of the cathedral completed in 1844

The chief part of the town lies on the right bank of the Vilaine. The cathedral, an old foundation, was begun in 1787 and completed in 1844. Other churches include those of S. Germain, 15th century, S. Sauveur, 1725, and of Notre Dame-en-S. Mélaïne, a 13th century abbey. The musée contains a notable collection of paintings and drawings by old masters. The palais de justice built 1618-54, was the meeting place of the old parlement of Brittany.

Rennes was the capital of the ancient Armorican tribe of the Redones. Capital of Brittany in the 9th century, its parlement was instituted by Henry II in 1551. A fire in 1720 destroyed many old buildings. The second Dreyfus trial took place in the Lycée, 1899.

Rennes was occupied by the Germans from June 17, 1940, until it was liberated, virtually undamaged, by American troops on Aug. 4, 1944. Pop. 113,781.

Rennet (Middle English *rennen*, to cause to run together). Extract from the lining of the fourth or rennet stomach of the calf. It is used for curdling milk in cheesemaking, and in the preparation of junket. The salted linings used in the preparation of rennet are known as vells. The curdling action is due to the ferment rennin, which causes the casein to coagulate and entangle the fat. Rennet also contains another ferment, pepsin, which plays a part in the ripening of cheese (*q.v.*).

Rennie, JOHN (1761-1821). British engineer. Born at Phantassie, East Lothian, June 7, 1761, and educated at Edinburgh university, in 1784 he obtained a position with James Watt, and the same year designed a steam engine in advance of all previous models. In 1791 he began as an engineer on his own account in London, carried out the construction of the Kennet and Avon, Rochdale, and other canals, and was responsible for the building or improvement of many docks and harbours, including the London docks, Hull docks, and the dockyards at Sheerness and Chatham, and the great breakwater at Plymouth. The old Waterloo bridge, London, replaced during 1825-42, was his masterpiece; London, Southwark, and Kelso bridges were also products of his genius. One of the greatest civil engineers of his time, Rennie was elected F.R.S., 1798, and died in London, Oct. 4, 1821.

His eldest son, George (1791-1866), extended the operations of the firm, adding shipbuilding on a large scale. His second son, Sir John Rennie (1794-1874), was also a distinguished engineer, and constructed works at Woolwich, Sheerness, Plymouth, etc., for the Admiralty. *Consult* Autobiography, 1875.

Rennin. Name given to a coagulating enzyme occurring in the gastric juices of man and the higher animals. An alternative name is chymosin.

Reno. City of Nevada, U.S.A., the co. seat of Washoe co. On the

Truckee river, it is 32 m. N. of Carson City, and is served by the Southern Pacific and other rlys. It is the seat of the state university, and has an agriculture experimental station. Farming, stock-raising, and mining are important local industries, and the city has manufactures of rly. plant, flour, lumber products, machinery, and plaster. Meat-packing and iron-founding are also carried on. Easily satisfied legal requirements for divorce and the short period needed to acquire Nevada citizenship (six weeks) have resulted in a widely known "divorce industry" at Reno. In 1945 there were over 7,000 divorces, though among permanent residents the divorce rate does not exceed the national average. Settled in 1868, Reno became a city in 1899. Pop. 21,500.

Renoir, PIERRE AUGUSTE (1841-1919). French painter. Son of a tailor, he was born at Limoges, Feb. 25, 1841. As a boy he painted flowers in a ceramic workshop. In 1861 he studied in Paris under Gleyre, meeting Sisley, Monet, Bazille, and Cézanne. He turned to Impressionism, first exhibiting at the Salon in 1864, and taking part in the Impressionist exhibition ten years later. As a result of his early interest in tone he tended to put the emphasis on colour without the sacrifice of light, and his paintings reflected his *joue de vivre*. To this period belong the *Odalisque*, and *La Loge*.

He then concentrated on rendering texture, and his sensual approach to nudes was first shown in the famous *Baigneuse* and *Moulin de la Galette*. One of his best-known works is *Les Parapluies* (in the Tate Gallery), a scheme of blue, lavender, and grey. After experimenting with a hard, emotionless style, he returned to the painting of rosy nudes. He produced some 6,000 paintings, and 155 lithographs. Renoir's art throughout is impetuous and spontaneous; there is little theorising; his life and art were completely one. His works are exhibited in the chief galleries of Europe and the U.S.A. He died at Cagnes, Dec. 3, 1919. *Consult* Lives, A. André, 1919; A. Basler, 1928; J. Meier-Graefe, 1929; C. Roger-Marx, 1933; P. Lund, 1945; Drawings, ed. J. Rewald, 1947.



John Rennie, British engineer



Pierre Renoir, French painter

Renown. British battle cruiser. Laid down in 1915, she was originally to be a battleship, but was designed afresh, and completed in 1916, at a cost of £3,000,000. In 1936-39 she was rebuilt and re-engined at much the same cost. Displacing 37,000 tons on a length of 787 ft. and a beam of 102 ft., she had geared turbines developing 120,000 s.h.p. to give a maximum speed of 32 knots. Armament consisted of six 15-in., eight 4.5-in., sixty 20-mm., and thirty 2-pdr. guns. Armour had been sacrificed for speed and armament and was considered too weak by Beatty, who refused to accept the Renown for service with the Grand Fleet until the plating had been stiffened.

During 1920-22 she took the prince of Wales on official visits to the U.S.A., Australia, New Zealand, India, and Japan, and in 1927 took the duke and duchess of York to Australia. Her first action in the Second Great War was with the Sehornhorst and Hipper off Norway in 1940. As flagship in the W. Mediterranean, she bombarded Genoa; and took part in the chase of the Bismarck. In 1943 Winston Churchill returned in the Renown from the U.S.A. The first meeting with German naval representatives to arrange the surrender in Norway took place on board her at Rosyth on May 7, 1945; and on Aug. 2 King George VI received President Truman on board at Plymouth. She was sold as scrap in 1947.

Rent (Lat. *reddere*, to pay). Money or other payment made for the use of land, houses, and other buildings. The economist regards rent as the share of production that falls to the lot of the owner of the land, as opposed to wages and interest that fall to the labourer and the capitalist respectively.

According to the theory of rent associated with the name of Ricardo, the amount of rent is fixed by an iron law. There is a class of land on the margin of cultivation, i.e. land which can only produce sufficient to pay for the labour and capital put into it. If any rent is charged, this land will fall out of cultivation. This serves as the basic line for rent, which rises or falls with the price obtained for the produce. A rise in prices will make it possible to cultivate land hitherto lying idle; a fall will have the opposite effect. Rent, therefore, is the surplus obtained from land, the amount it produces in excess of that produced by land on the margin; in other words, it is the difference between the total cost of the

product and its value in the market. It is none the less rent if paid to the cultivator who is the owner, and the principle still holds, even if custom does not allow the landlord to exact the full rent. An application of the same theory accounts for the high rent paid for building land in crowded centres, the so-called ground rent. It is the amount at which a man values the worth to him of an advantageous position over one that he can obtain for practically nothing.

Ricardo's idea is probably unassailable as a theory, but the intermixture of land and capital is so close that rent tends to approximate more and more to interest on money invested. There are, however, differences between rent and other forms of income, due to those between land and other forms of capital, and on these are based proposals for the special taxation of rents.

In the popular sense rent is the payment made for occupation of factories, houses, land, etc., and is therefore only a form of interest on capital. It is regarded as due in England and Wales on the four quarter days (*q.v.*). Landlords of small houses usually pay the rates thereon and include this amount in the weekly rent. If the rent is not paid on the appointed day, the landlord has the right of distress. In Scotland distress is not permitted, but the law provides other remedies. A rent charge is an income charged by will or settlement upon certain rents. Quit rents were payments made to lords of manors to free the tenant from miscellaneous charges. *See* Capital; Distress; Interest; Land; Landlord; Single Tax; Tenant.

Renter. One who occupies a property or accommodation by virtue of paying a rent; more commonly called a lessee or tenant. In the cinema industry, the term renter has the opposite meaning, denoting an organization which lets out films to exhibitors.

Rentes (Fr., yearly income; rent; annuity). The general term for French government stocks, roughly corresponding to the English Consols. The ownership of *rentes* is very widely dispersed among the French people.

Rentier (Fr.). Originally a holder of *rentes*, French govt. bonds. The term is now used to describe anyone who lives on the income from investments.

Renton. Town of Dumbartonshire, Scotland. It stands on the right bank of the Leven, 2 m. N. of Dumbarton, and has a rly. station.

The earlier industries of dyeing, bleaching, and calico printing are being superseded by light engineering works. The chief building is the parish church. Dalquhurn House, now pulled down, was the birth-place of Smollett, whose family owned land here, and whose sister founded the town. It was named after her daughter, who became Lady Renton. In the early days of club football the local team were world champions. Pop. 5,367.

Rent Restriction Acts. Series of statutes in the U.K. designed to prevent tenants from being evicted from their houses or having their rents increased except on specified grounds. The first Rent Restriction Acts were made necessary by a housing shortage during the First Great War. That of 1915 was passed as a temporary measure, intended to endure only until six months after the war and applying only to low-rated houses. It was extended and finally replaced by the more permanent Act of 1920 which applied to all but very large houses. To a large extent this has remained in force ever since. By 1923 houses were more plentiful, and a new Act introduced the principle that once a house became empty it was decontrolled and the landlord could let it on such terms as he pleased. In 1933 another Act automatically decontrolled the largest houses previously within the Act, but prevented further decontrol of the smallest. The law remained unchanged as to houses between these two extremes. In 1938, an Act decontrolled the largest remaining houses. On the outbreak of war in 1939 control was re-imposed over all houses whose rateable value did not exceed £100 in London, £90 in Scotland, or £75 elsewhere. Some important amendments were made by the Landlord and Tenant (Rent Control) Act, 1949.

The present state of the law is thus very complicated. One set of laws applies to houses which have been controlled since 1920 or earlier; another set to houses which before 1939 were not controlled, either because they never had been—e.g. they were built after 1919—or because they had been decontrolled. These laws do not apply to furnished houses.

The main grounds on which a landlord may recover possession from a tenant are (1) that the tenant is in arrears with his rent; (2) he is causing nuisance or annoyance to adjoining occupiers; (3) he has assigned or sublet the whole house without the land-

lord's consent; (4) the house is overcrowded contrary to Housing Acts; (5) it is reasonably required by the landlord as a residence for a whole-time employee or an agricultural worker; (6) it is reasonably required by the landlord to live in, or for his son, daughter, father, or mother; (7) there is suitable alternative accommodation. In no case is the court bound to give the landlord possession.

These Acts have also prevented the landlord from increasing the rent except on certain grounds. Again, houses which were controlled before Sept., 1939, are in a different position from those brought under control in that year. For both classes there is a standard rent, normally the rent at which the house was let on Aug. 3, 1914, in the case of old-control houses, and Sept. 1, 1939, in the case of new-control houses. The standard rent of houses let for the first time after Sept. 1, 1939, may now be fixed by a rent tribunal. To this the landlord may add the amount by which the rates have increased since 1914 or 1939; he may also add a percentage of expenditure on improvements (not mere repairs) since either date (6 p.c. on expenditure before July 2, 1920, 8 p.c. after). For old-control houses he may also add 40 p.c. of the net rent in 1914 where he is liable for repairs, and 15 p.c. where he is not. The net rent, where the landlord pays the rates, is the amount of the standard rent less rates.

The Acts also give certain protection to mortgagees in respect of increase of mortgage interest and of calling in the mortgage.

Rent Tribunal. Local tribunal under the ministry of health. It can give tenants of furnished premises three months' security of tenure, and can fix reasonable rents for furnished premises, and standard rents for unfurnished premises first let after Sept. 1, 1939.

Renwick, JAMES (1662-88). Scottish Covenanter. Born at Moniaive, Dumfriesshire, Feb. 15, 1662, he was educated at Edinburgh and Groningen, where he was ordained. From 1683 he preached in Scotland, but was outlawed by the privy council of Edinburgh. His open repudiation of the claims of James VII to the throne led to his arrest, and he was hanged, Feb. 17, 1688.

Repairs. By English law the liability to execute necessary repairs to a house is almost entirely a matter of contract. Land-

lord and tenant are each liable to carry out repairs for which they have undertaken liability in the tenancy agreement, and are not liable for other repairs. Thus it frequently happens that neither can compel the other to carry out some repair. There are exceptions to this rule. With houses let at a rent not exceeding £40 in London or £26 elsewhere it is implied, in spite of any provision to the contrary in the tenancy agreement, that the house is reasonably fit for human habitation at the beginning of the tenancy and that the landlord will keep it in such repair during the tenancy. With all premises let furnished it is implied, in the absence of contrary provision in the tenancy agreement, that the premises are fit to be lived in at the beginning of the tenancy; but there is no implication that the landlord will be responsible for defects developing during the tenancy. With flats it is implied, in the absence of any provision to the contrary, that the landlord will take reasonable care to ensure that portions of the building not let to the tenant but regarded as retained by the landlord for the convenience of the tenants of all the flats are in good repair. Thus he is liable if because of his lack of care the roof is defective.

The Landlord and Tenant Act, 1927, limits the damages which a landlord may recover for failure to repair to the amount by which the value of the reversion has been diminished. This may mean that no damages at all are recoverable, e.g. where the district has ceased to be residential. Nor are any damages recoverable if the premises are shortly to be pulled down or structural alterations are to be made that would render the repairs valueless. The Leasehold Property (Repairs) Act, 1938, protects tenants of houses with a rateable value not over £100 by providing that where five years or more of the lease remains unexpired, the landlord cannot exercise any rights against the tenant in respect of breach of a covenant to repair unless he obtains the leave of the court. See Landlord; Rent Restriction Acts.

Reparations (Lat., *reparare*, to repair). Term introduced during the First Great War and used later to indicate the means by which Germany should make compensation for damage and loss caused to civilians during the war. Reparations were to be made in money and in kind (coal, machin-

ery, livestock, existing shipping and new ships, etc.). The payment of reparations was to be supervised by an inter-Allied reparations commission. In January, 1921, the financial council of the Allies assessed total reparations at 132 milliard gold marks (£6,600 millions). This Germany failed to fulfil. In 1924 the Dawes Plan (*q.v.*) and in 1929 the Young Plan (*q.v.*) were introduced, but German economy still did not revive, and it was agreed in 1932 at a conference in Lausanne that reparations should be cancelled, and that Germany should instead deposit with the bank for international settlement gold bonds, secured on the German railways, to the value of £150 millions. These bonds were to be marketable from 1935 to 1937, and were to bear interest at 5 p.c.

The attempts to secure reparations from Germany for the incalculable damage to property and loss suffered by civilians during the Second Great War took the following forms: (a) the employment of Germans in the work of reconstruction in devastated regions, or in the manufacture or agriculture of the victorious country; (b) the dismantling and removal of factories, plant and machinery, vehicles, stocks of materials, etc., for use in the country of one of the Allies; (c) the working in Germany of factories, etc., for the benefit of the occupying power; (d) the dissemination among the Allies of valuable technical information secured by investigating commissions. It is doubtful whether the Western Allies received benefit at all comparable with the vast sums they expended to maintain the industrial population of the zones they occupied. The Russians were stated to have secured reparation on a considerable scale. It would probably be impossible for the German nation to make such reparation as would constitute complete restitution.

It was cogently argued by Sir Norman Angell, Lord Keynes, and others, that in the modern world reparations are a myth, and that the attempt to secure them must really injure the victors as well as the vanquished. Consult The Great Illusion, Norman Angell, 1911; The Economic Consequences of the Peace, J. M. Keynes, 1919.

Repatriation. Act of returning a forcibly removed person to his or her country of origin. Repatriation became a major international

problem after the Second Great War, and involved the movements of millions of displaced persons, and the return to their own countries of large numbers of released prisoners of war. See Displaced Person.

Repertory Theatre. Theatre which maintains a regular company performing standard plays for limited runs. The Théâtre Français (*q.v.*) is the archetype; there was repertory in Paris, Vienna, Berlin, and other Continental places before the idea was adopted in Great Britain. Here the beginning may be dated 1891, with the founding of The Independent Theatre, by J. T. Grein, and of The Stage Society. The repertory theatre is organized to pay its way rather than to make profit. The players are professional, though there are amateur repertory companies which may have their own theatres. The plays have theatrical, artistic, and educational merits. Since the Second Great War the tendency has grown to make the run two or three weeks instead of one.

Playgoers' societies, play readings, and other activities are often organized by repertory theatres. St. John Ervine, as Shute lecturer on the art of the theatre at Liverpool university in 1923, advocated the grouping of repertory and touring companies so that each would require to give a new play only once in three or four weeks. The nucleus of the group system was created by the Arts Council's West Riding theatre, with three interchangeable repertory companies at Halifax, Huddersfield, and Wakefield; also by its introduction of the Old Vic company to Bristol's Theatre Royal, where a production plays for three weeks and then visits either Bath or Weston-super-Mare. In 1946 Amersham repertory began to exchange productions weekly with Guildford. Dundee repertory experimented successfully with running a show for a fortnight.

Liverpool Playhouse, founded in 1911, is the oldest existing repertory theatre in Great Britain, but the third to be started, its predecessors having been Miss Horniman's Manchester repertory at the Gaiety (1908) and the Glasgow repertory theatre (1909). In 1939 The Stage list of such theatres included 75 companies; in 1946, 220. Some of these were seasonal, but permanent companies numbered 100. Glasgow Citizen's theatre, founded by James Bridie in 1943 to give

"plays of artistic or didactic merit which would not otherwise be seen in Glasgow, of a quality sufficient for Scottish dramatists (if any) to write up to," is a pioneer Scottish enterprise. About 1,500 shareholders own the Liverpool Playhouse, which prospered increasingly after William Armstrong (*q.v.*) was appointed producer and director in 1922. West End stars produced by him were Diana Wynyard, Mary Hinton, Catherine Lacey, Marjorie Fielding, Judy Campbell, Robert Donat, Rex Harrison, Michael Redgrave, Herbert Lomas, Robert Speaight, Cecil Parker. The Old Vic took over the theatre 1942-46, after which the directors resumed control, Armstrong becoming assistant director at the Birmingham repertory.

Birmingham repertory really began in the dining-room of Barry Jackson's (*q.v.*) house, where Foot's The Liar was performed in 1903. Then amateur productions were given; and in 1913 the Birmingham repertory theatre was opened. First productions there have included the complete cycle of Back to Methuselah; Drinkwater's Abraham Lincoln; and Boughton's The Immortal Hour.

Miss Horniman started the Abbey Theatre (*q.v.*) in Dublin in 1903 "to encourage and to stimulate local talent." Her work at Manchester "discovered" Stanley Houghton, Allan Monkhouse, and Harold Brighouse as dramatists; Dame Sybil Thorndike, Lewis Casson, Irene Rooke, Milton Rosmer, were with the Manchester repertory early in their stage careers. Other players who acknowledged having had their chances in repertory companies included Edith Evans, Flora Robson, John Gielgud, Gwen Ffrangcon-Davies, Sir Ralph Richardson, Sir Cedric Hardwicke.

The Oxford Playhouse was started by J. B. Fagan in 1923, and the Cambridge Festival Theatre, opened in 1926, was founded to destroy the influence of what the director, Terence Gray, described as "the old game of illusion and glamour and all the rest of the 19th century hocus-pocus and bamboozle." The Vedrenne-Barker season at the Court Theatre, London, 1904-07, is referred to as "repertory"; there 988 performances of 32 plays were given.

Harold Downs
Bibliography. The Organized Theatre, St. J. Ervine, 1924; The English Theatre, A. Nicoll, 1936; The Other Theatre, N. Marshall, 1946.

Repington, Charles A. COURT (1858-1925). British soldier and military critic. Born Jan. 29, 1858, he went to Eton and Sandhurst, and into the Rifle Brigade in 1878. After serving in Afghanistan, Burma, and the Sudan, he entered the War office intelligence dept., and was for a time military attaché at The Hague. During the S. African War he was on Buller's staff, but was invalided home. In 1902 he left the army with the rank of colonel, and joined The Times as military critic, transferring to the Morning Post in 1918. After publishing some Memoirs in 1919, he produced in 1920 the work by which he is best remembered, The First World War, incorporated the so-called "Repington Diaries." The book caused considerable controversy by its revelation of a background of social gossip and "string-pulling" to the policies and events of the war, as well as by its own indiscretions of criticism. But it is valuable as a contemporary social document. Repington died May 25, 1925.

Replevin (Old Fr. *re*, again; *plevine*, warranty, from late Lat. *replegium*). In English law, a personal action to recover possession of goods or chattels taken or detained unlawfully or without sufficient cause. Action of replevin, usually but not solely applicable to distraint for rent, is now almost obsolete, being replaced by action for damages for illegal distress. See Distress; Pound; Rent.

Reporting. In journalism, writing reports of public speeches or descriptions of events of public interest. Notable examples are the reporting of parliamentary proceedings, trials in the law courts, and cases in the police courts. The term is applied also to the official reporting of parliament (see Hansard). Reporters of legal trials are often barristers. Newspaper reporting is of a most varied character, and calls for equally varied qualities on the part of the reporter. Usually, while on country newspapers the reporter finds himself called upon to put his hand to all branches of reporting, on the great daily papers the work is divided among descriptive writers, who specialise in particular branches—e.g. sport or industrial affairs—and shorthand writers, whose task is to record verbatim the utterances of public speakers.

During the 20th cent. verbatim reporting was reduced to a minimum, and confined to the record-

ing of speeches of primary importance or of trials of a sensational character, the formal record of which was introduced by a descriptive summary. The work of the average reporter consequently changed from a mechanical occupation, in which accuracy was the chief quality demanded, to one in which the power of succinct descriptive writing was of the first importance. At the same time a knowledge of shorthand on the part of the reporter, though he might not be called upon to use it often, was occasionally invaluable. See Journalism ; Newspaper ; Shorthand.

Repoussé. Art of ornamenting thin sheets of metal by hammering out designs from the back of the sheet. Practised by the ancient Egyptians and the Etruscans, it reached its highest perfection in the 18th century, in the time of Cellini (*q.v.*), who was perhaps its greatest exponent. In carrying out the art a large number of small hammers of varying sizes and weights are used, the handles of the hammers being as elastic as possible, in order that they may respond to the lightest touch of the craftsman. When the design has been hammered out from the back or the inner surface of the article, the raised portions are generally finished by gravers or chasers. As the metal usually has been hammered out very thin, a backing of pitch is attached to provide a firm bed for the engraver to work upon. The metals which have chiefly been used in this art are gold—peculiarly suitable—silver, copper, tin, pewter, and lead. Some beautiful examples of repoussé work are in the Victoria and Albert museum at S. Kensington, London.

Representation (Lat. *re*, again; *præsentare*, to present). In politics, the method by which people entrust the duties of legislation and government to men and women of their choice. In theory it gives those representatives a greater freedom of action than is enjoyed by mere delegates or the holders of proxies. The representatives are chosen by some form of ballot. (See Election.)

Representation in the modern sense was unknown in the civilization of the ancients. There the citizen and freemen acted, whenever necessary, in person, but if a choice had to be made, it was usually done by lot or went by seniority. Kings and priests may be said to have represented the people, but not in the modern sense of the word.

The existing system began probably in assemblies of the Church, and appeared soon in the secular affairs of Teutonic peoples. In England the reeve and four men were summoned from each vill to answer for the state of that community, and the principle was quickly extended. The jury was representative. Then came the summons of knights of the shire to parliament and, a most important



Repoussé. Breastplate of Philip IV of Spain, now in the Victoria and Albert Museum, South Kensington

step, their election to the county court. These were representatives, although the word itself was not used for them until the seventeenth century.

About the end of the 18th century the ideas of the French Revolution gave new form to the theory of representation, and in the 19th century almost every kind of local authority became a body of elected representatives. Previously J.P.s had been representatives, although not elected, and before that time the lords of feudal times had represented their vassals before the king or other overlord. Most

European nations followed England in making use of political representation, while the system was carried by British emigrants into the countries in which they settled. See Democracy ; Franchise ; Government ; Politics.

Representation of the People Acts. Official designation of Acts of parliament governing parliamentary suffrage in the U.K. The chief Acts have been those of 1918, 1928, 1945, and 1948. See Commons, House of ; Franchise ; General Election ; Redistribution ; Reform Acts.

Representative Peer. One of sixteen members of the Scottish peerage who sit in the house of lords. Scottish peers are not members of this house by right, so for each parliament sixteen are elected by the entire adult peerage of Scotland specially convened for that purpose. Until the establishment of the Irish Free State, 28 representatives from the Irish peerage were similarly chosen, but as life members, to sit in the house of lords, and some Irish peers elected before 1920 still retain their seats, though no elections are held to fill vacancies.

Representatives, HOUSE OF. Lower house, or popularly elected house, of the congress of the U.S.A. Its membership varies in number from time to time, being settled every ten years on a population basis. At the 1948 election it numbered 435. An election takes place every two years, the qualifications of the voters, who include men and women, varying from state to state, while the necessary period of residence also varies. According to the constitution, members of the house must not be under 25 years old, and must reside in the state which chooses them. Custom also requires them to reside in the constituency they are chosen to represent.

The house is presided over by a speaker, and all legislation must be approved by it ; but it differs from the British house of commons in excluding from membership all who hold ministerial office. Members receive a salary of \$12,500 a year and travelling and other expenses. They are divided into parties, the two most important being Democrats and Republicans. (See under those names.)

The elected chamber in the parliament of the Australian commonwealth is also called the house of representatives. It consists of a varying number of members, regulated according to the most recent census, but no state can have fewer

than five. In 1948 the number of representatives was 74. They are elected for three years unless the house is dissolved earlier. Some of the representative assemblies in New England states in the 17th century were called by this name.

Repression (Lat. *reprimere*, to check). Psychological term meaning the driving of some piece of knowledge from consciousness by an automatic and unconscious process. It should not be confused with suppression, which is deliberate. The extreme case of repression is the complete amnesia which may follow a violent shock, e.g. being blown up by a bomb. Every type of mental material, however, may be more or less subject to this process—beliefs, wishes, feelings, as well as memories. Complete amnesia is far rarer than partial repression. Displays of excessive and irrational anxiety may be signs that people possess repressed memories of earlier events which caused fear, while not being able to control the emotion itself. Repressed material does not cease to exist. It remains in the unconscious (*q.v.*) mind unless recalled by some form of psychiatric treatment. During sleep, or when the external circumstances resemble those which caused the original repression, the buried elements struggle to return to consciousness. A soldier suffering from amnesia may shout, scream, or wave his arms in his sleep, i.e. he will tend to reproduce as far as possible the gestures and noises he was making just before repression took place. As a rule, however, repressed material can return only in disguise. Repressed material issuing in such distorted form may have influence on daily life. Choice of occupation or of a marriage partner, political beliefs, hobbies, family relations, etc., may be affected by these unconscious mental conflicts.

The agent of repression is the super-ego (*q.v.*). This mechanism floods the conscious mind with unbearable anxiety or shame when wishes or feelings appear which are strongly forbidden by one's moral code. Repression is the first line of defence against this anxiety, and where it is rational it is a useful force in normal life. As repressions multiply, however, the activities will tend to become more and more restricted as complexes grow. See Complex.

Reprieve. In law, withdrawal of the sentence on a prisoner for an interval of time whereby the execution is suspended (Blackstone). This may be done by the judge

when he is not satisfied with the verdict or with the legality of the conviction. A reprieve is granted in all cases where the prisoner becomes *non compos mentis* between the judgement and the award of execution. There is another form of reprieve, by the royal grace, which is part of the king's prerogative of pardon, and in every country the head of the state has the power of reprieve by way of grace. See Pardon.

Reprisal (Fr. *représaille*, from Lat. *reprehendere*, to take again). Retaliation or vengeance. In international law the word has two meanings. During peace, reprisals are injurious acts committed by one state against another to compel that other to remedy some real or alleged misconduct of which it has been guilty. Thus where one state has broken a treaty the other party to the treaty may, in order to obtain redress, take steps which otherwise would be illegal—e.g. seize the ships of the first state. During time of war, reprisals are acts contrary to the rules of war committed by one belligerent against another as retaliation for illegal acts committed by the first belligerent. The object is to compel that belligerent to cease committing illegal acts. Thus a belligerent may be induced to refrain from infringing the rules of war by the fear of the reprisals that might follow an infringement. On the other hand, reprisals, being acts contrary to the laws of war, may themselves lead to counter-reprisals, and these to further reprisals, and on this principle almost any of the laws of war may be broken.

During the First Great War, the Germans attempted to justify many of their atrocities in Belgium as reprisals for the killing of their troops by civilians. In the Second Great War, Great Britain on Nov. 27, 1939, issued an order for the seizure of goods at sea loaded in German ports as a reprisal for German mine-laying and submarine warfare. The Hague convention of 1929 prohibited the taking of reprisals on prisoners of war.

Reproduction (Lat. *re*, again; *producere*, to bring forth). Term for the biological process by which new organisms arise from pre-existing ones. The simplest methods of reproduction are to be found among unicellular organisms. Many of these split into halves (binary fission), thus doubling

their number and halving the chance of accidental death. Concomitantly the volume of the cell is halved, but its surface in proportion to its volume is increased and so affords a relatively greater facility for exchange of material between the protoplasm and its environment, and consequently a possibility for acceleration of life processes generally. When the products of fission grow quickly and repeat the process at short intervals the rate of production of new individuals exceeds the rate of accidental death and the race multiplies, often rapidly. For example, many bacteria may divide again 30 mins. after they were formed in the previous fission. A continuation of reduplication at this rate, did all individuals survive, would in ten hours give more than a million offspring from an original one. Such a rate is, however, not maintained. The consequent drain on the food supplies and rising concentration of waste products in the surroundings impose a limit to numbers, though this limitation may be delayed by the spreading of individuals.

Reproduction by Spores

Asexual spore formation is another method of reproduction which is also potentially one of rapid multiplication. It is common among algae and fungi, and to a somewhat lesser extent among the lower animals. It resembles fission intrinsically in that the new organisms are initiated by the separation of parts of the protoplast of an older one, but differs in that usually more than two are formed at a time. In some instances, as in fission, the whole of the parental protoplast is shared among the offspring; in others, especially when the body of the organism is extensive, part is not used in the process and may continue its existence to reproduce again later. In some few cases, e.g. in *Volvox*, the spores produced in one structure retain contact and so grow into a colony, but in most the simultaneous production of numerous offspring necessitates their dispersal to avoid overcrowding. Many algae, e.g. *Oedogonium*, and water-inhabiting fungi, e.g. *Saprolegnia*, though themselves non-motile, form asexual spores which swim and so scatter. The fungi, such as the pin mould, which grow in relatively dry conditions, form non-motile spores that are readily carried as dust in the wind. The probability that

some of these wind-borne spores will alight in situations suitable for development may be gathered from the estimate that a fair sized mushroom liberates some 1,800,000 spores. The scattering, however accomplished, confers on each new organism a chance of starting life untrammelled by the previous generation and relieved of excessive competition from its fellows. Moreover when spores are dispersed some distance, opportunities arise for the establishment of the race in a new locality, i.e. migration occurs.

The process of budding, characterised by the formation of outgrowths from the parent, may lead to the production of young, either as single cells or as organized groups of cells. The former occurs, for example, in the unicellular yeast plant and in the Foraminifera, the latter in some liverworts, Hydrozoa, and several groups of worms. The buds may separate immediately they are completed, or remain attached to form a colony which may be a temporary association, as it is in yeast, or the characteristic form of the organism, as in many of the sedentary Hydrozoa. Some of the buds in the colonies of these animals become special sexual individuals, and sometimes these swim away like tiny jelly fish. A similar specialisation of buds for sexual reproduction occurs in some of the marine worms whose tail end breaks off as a freely swimming unit. The Palola of S. Pacific reefs regularly with the dawn of the last day of the last quarter of the Oct.-Nov. moon breaks off the tail half of its body. The surface water becomes alive with these swarming fragments, which shed their eggs and sperm in it.

Vegetative Reproduction

Somewhat analogous to budding is the process of vegetative reproduction which occurs in many of the higher plants, though it is by no means confined to them. New strawberry plants arise from buds on the runners of old ones; potato plants sprout from tubers. A part of the parent plant grows out and becomes separated. Under natural conditions the incept for the new individual is located where it is to grow at a short distance from the parent before the connexion between decays. Structures such as rhizomes and tubers, which facilitate vegetative reproduction, frequently also serve as depositories for food, and so afford the offspring ample nourishment during their period of establishment.

In many instances they remain dormant through inclement periods and develop only when conditions are favourable for vegetative activity. These features of vegetative reproduction confer a surety which outweighs any disadvantage due to the few offspring initiated.

Sexual Reproduction

Among the lower organisms, reproduction by simple asexual means is the rule. Most organisms, however, resort periodically to sexual reproduction, in higher animals the only method available. This process involves a twofold reorganization in the production of the two kinds of gamete and perhaps, in their fusion, an additional stimulus to development which, however, may not be immediately effective. The zygote may pass into a resting condition, to renew its activity some time later. Sexually produced young tend to differ from their progenitors on account of the reassorting of genes during the meiotic divisions which lead to the formation of gametic nuclei, and in that additional sense they are usually new organisms. This is true even when they are the product of one bisexual self-fertilised parent, unless that parent is also completely homozygous, and so sexual reproduction brings variety in its train. The new generation may also differ from its immediate forebears in the way it reproduces. In ferns, for example, the gametes are formed by inconspicuous plants called prothalli, but the zygote develops into an ordinary fern plant, the fern in due course producing spores which grow up into prothalli again. Alternation of generation is the rule in all plants except thallophytes, though in seed plants it is obscure because the sexual generations are contained within the ovules and pollen grains.

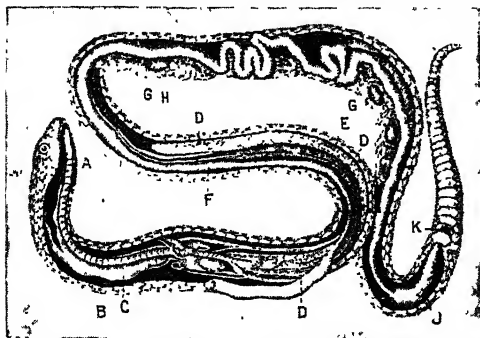
Seeds which normally form only after a fusion of gametes inside them may be produced in large numbers—the foxglove produces some 80,000 per plant—and may be dispersed in various ways. A life cycle comprising more than one generation is common among the protozoa, where variations in it and of the form assumed by individuals at different times may be related to changes in the environment as well as distribution and gamete formation. More than one generation is the exception among the metazoa, meiosis and gamete formation occurring usually just before syngamy. The highest animals are in general the

least prolific and secure dispersal in the adult condition. Despite the prevalence of sexuality in most races, gametic fusion is not always essential to development. Numerous instances of parthenogenesis involving development from unfertilised eggs are known, and for this reason syngamy is by some considered as a process facilitating variation, but not an intrinsic part of reproduction.

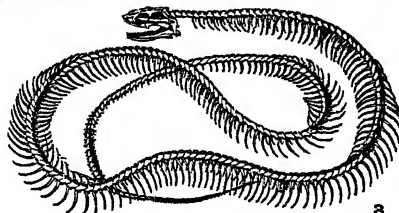
As has been said, the reproduction of the higher animals is sexual. In mammals and some other forms of animal life fertilisation of the eggs is internal, necessitating the passing of male sperms into the body of the female. This is accomplished at copulation by the insertion of the male intromittent organ, or penis, into the female vagina. The spermatozoa from the male reproductive organ, the testes, are set free either in the vagina or, in some forms, in the uterus. They are contained in a complex fluid medium derived from the prostate and associated glands. The fluid, together with the spermatozoa, is called the semen or seminal fluid. At body temperature and in the presence of oxygen, the sperms are active, and swim up through the oviducts to meet the eggs.

REPRODUCTION BY ARTIFICIAL INSEMINATION. If the seminal fluid of animals is cooled slowly, the sperms become inactive, especially if oxygen is withheld from them. In this state the seminal fluid may be kept a long time. On being warmed and on the readmission of oxygen, the sperms resume activity. If the seminal fluid is then inserted in the vagina of a female who has eggs ready to be fertilised, the probability is that they will be fertilised. Seminal fluid thus used artificially may be diluted at least 8 times with success, so that many more horses, for example, can be obtained from a sire by this means than by natural mating. The semen, similarly treated, can be transported for long distances. Development of a process for the artificial insemination of queen bees was undertaken with the object of improving the races used for honey production.

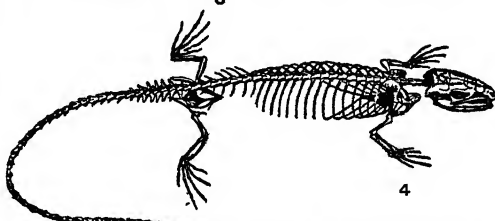
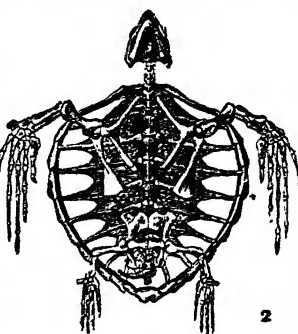
Artificial insemination among human beings is occasionally adopted in childless marriages where the male partner is infertile, or by an unmarried woman wishing to have a child. It should be contemplated only after very careful consideration and under adequate medical and legal safeguards.



Reptile (Lat. *reptilis*, crawling). Class of back-boned animals (Vertebrates) with cold blood, which breathe air by means of lungs and are reproduced by eggs, which are sometimes retained in the body until ready to hatch. The class consists of five existing orders, but fossil reptiles constitute as many more orders. Of existing orders one is represented solely by the iguana-like *Tuatera* (*Sphenodon*) of New Zealand, the second by the tortoises and turtles, the third includes the crocodiles and alligators, the fourth the lizards, and the fifth the snakes. Formerly the amphibious animals (*Batrachia*) were classed as reptiles, as they are still re-



With the exception of some herbivorous tortoises, all the reptiles are carnivorous, their food ranging from mammals to insects and worms. In the turtle and tortoise the upper and under sides are protected by great shields, formed by modifications of the skeleton and covered with thin plates of horn. In the crocodiles ordinary scales are more apparent on the feet; on other parts there are bony plates formed in the skin. In the lizards and snakes the scales are mostly small, horny, and overlapping, outgrowths from the skin, with which they are shed from time to time. See *Animals*, colour plate; also *Chameleon*; *Crocodile*; *Gecko*; *Iguana*; *Lizard*; *Snake*, etc.



Reptile. 1. Viscera of a serpent: A. Mouth. B. Gullet. C. Trachea. D. Lung. E. Liver. F. Stomach and intestine. G. Egg. H. Ovary. J. Cloaca. K. Vent. 2. Skeleton and carapace of a logger-headed turtle, from beneath. 3. Skeleton of a snake. 4. Skeleton of common lizard

Repton School. English public school. It owes its origin to Sir John Port, of Etwall, who left money to found a grammar school, and this was opened at Repton, Derbyshire, in 1557. In the 19th century it developed into a leading public school, and has now over 400 boys. They live in eight houses, and there are classical and modern sides, as well as an army class, and other kinds of special training. The school has entrance scholarships, and several to assist those leaving the school to enter the universities.



Repton School arms

Republic (Lat. *res publica*, public affairs). Form of the state in which the supreme authority is vested in the citizens, or a privileged class of citizens. It is thus opposed to a monarchy, the head of which derives his power from hereditary descent. The distinction is not always rigidly maintained,



Repton, Derbyshire. School buildings, with remains of priory on left, and Pears School, built in memory of a former headmaster. Top, left, parish church of St. Wystan

Valentine

garded in the popular view; but the soft glandular skin, devoid of scales or plates, and the fish-like larval stage separate them. The skull is bony, and the jaws furnished with teeth, except in the turtles and tortoises, where they approximate more to a bird's bill.

for the elective monarchy of Poland was called a republic.

The city-states of the ancient world were mostly republics, which generally succeeded earlier monarchies. Some were aristocratic and some democratic, i.e. the politically privileged classes were small or large, but none were democratic in the modern sense, there being no representative machinery, and large classes—slaves, resident aliens, and others—being without political rights.

The weakness of the medieval empire allowed the rise of republican city-states in Italy, of which the strongest was the close oligarchy of Venice, and the most brilliant and turbulent the democracy of Florence. At the same time city republics arose in Germany and the Low Countries, and formed federations, notably the Hanseatic league, three members of which, Hamburg, Lübeck, and Bremen, maintained the medieval type in a modified form until modern times. San Marino and Andorra are two other remarkable survivals. More democratic, although often tending to oligarchy, were the Swiss cantons, which in the 14th century formed a federation, the model of the modern federal republic.

The republic of the United Provinces of the Netherlands, 1581, set an example followed by the British Commonwealth, 1649.

Modern Republics

The modern democratic republic begins with the adoption of federal republicanism by the British colonies in North America, 1776, soon followed by the centralized French republic, 1793, which, while itself passing into the Napoleonic empire, endeavoured to found daughter republics in other countries. The U.S.A. and France consciously imitated the austere simplicity belonging to the republican traditions of ancient Greece and Rome. Latin America followed the U.S.A. with republican constitutions, some federal, others centralized.

A period followed in which the monarchical principle gained ground, though Brazil became a republic in 1889, Portugal in 1910, and the venerable Chinese empire transformed itself, nominally at least, into a federal republic of the American type in 1912. The First Great War, with the collapse of the continental empires, made Europe and the world predominantly republican, federal republics being then established in Germany and Austria; centralized republics in Poland, Czecho-Slovakia, Finland,

the Baltic states, and the Caucasus; and an entirely new type, the Soviet republic, in Russia and her remaining dependencies. Later Spain, and various Balkan countries, which had retained their monarchies, became republics, and after the Second Great War Yugoslavia and Rumania voted for republican constitutions. In 1937 the Irish Free State adopted a republican constitution and resumed the ancient name of Ireland, Eire, remaining however, associated as to external affairs with the British Commonwealth. See Democracy; Federalism; Government; Oligarchy; Politics; Soviet.

Republican. River of the U.S.A. Formed by two forks in E. Colorado, it follows a N.E., E., and S.E. course, uniting with the Smoky Hill River at Junction City to form the Kansas River. It is more than 500 m. long.

Republican. Political party in the U.S.A. The party organized by Jefferson bore this name, 1825–30, though it became afterwards the Democratic party. The existing Republican party dates from the anti-slavery agitation. It developed from a union of Whigs, Democrats, and others, men who were against the extension of slavery, and the name Republican was adopted in 1854.

The party secured the election of Lincoln as president in 1860. It controlled American politics to the full extent of electing a president and dominating the senate and the house of representatives until 1874. The control of the latter house was lost in 1874, but the Republicans kept their hold upon the presidency until the election of Cleveland, a Democrat, in 1884. From 1888 they were again in power, but they were beaten in 1892. In 1896 the party had majorities in both houses of congress, and their candidate was elected president. In 1904 their candidate, Theodore Roosevelt, was again successful, as was Taft in 1908. In 1912 Roosevelt and his followers broke away from the party and enabled the Democrats to bring about the election of Wilson and to obtain a majority in both houses. The Republicans regained the presidency with Harding in 1920 and kept it with Coolidge in 1924 and H. Hoover in 1928. In 1932 the Democrats regained control under F. D. Roosevelt. From 1946 a predominantly Republican congress was in conflict with a Democratic president (H. S. Truman).

The leading features of the Republican programme have been

the strengthening of the central government as against the local spirit of the separate states; the maintenance of a gold standard; and the protection of American manufactures by a tariff system. At the end of the First Great War the party opposed the entry of the U.S.A. into the League of Nations.

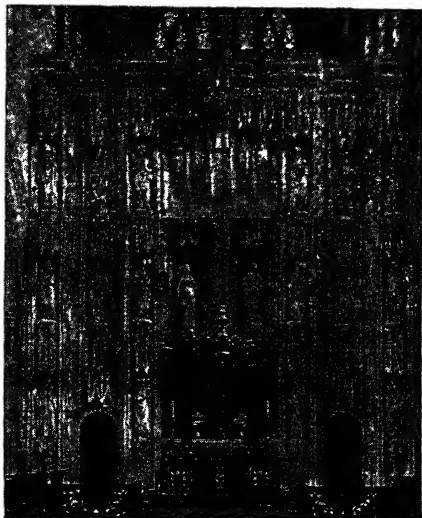
Repulse. Former British battle-cruiser. A sister ship of the *Renown* (q.v.), she was laid down in Jan., 1915, and completed in Aug., 1916. Like the *Renown*, and for the same reason, she saw little service in the First Great War. While operating with the Prince of Wales (q.v.) off the coast of Malaya she was sunk by Japanese aircraft on Dec. 10, 1941.

Requena. Town of Spain, in the prov. of Valencia. It stands on a hill, 25 m. direct and 47 m. by rly. W. of Valencia. It has relics of the old town walls, and a church dating from the 13th century. The S. part with its narrow tortuous streets and manorial houses retains a medieval aspect. Silkworms, vines, cereals, fruit, and saffron are cultivated. In the vicinity are the mineral baths of Fuente Podrida. Pop. 20,700.

Requiem. Name given to the Mass for the dead (*Missa pro defunctis*), the word being the first of the introit of this office—*Requiem aeternam dona eis, Domine*—Grant to them eternal rest, O Lord. The requiem mass, which is sung on All Souls Day, Nov. 2, is celebrated with black vestments, and the Credo and Gloria in Excelsis are omitted. Music for sung requiems has been written by many great composers, including notably Palestrina, Vittoria, Mozart, Cherubini, Berlioz, Brahms, Verdi, Fauré, and Stanford.

Reredos (rear; Fr. *dos*, Lat. *dorsum*, back). In ecclesiastical architecture, the screen or wall at the back of an altar. Originally it was merely a hanging of silk or tapestry suspended from hooks in the walls or ceiling of the sanctuary, and in this form it was subject to frequent changes, corresponding to alterations in ritual. In the Middle Ages it became more substantial, but was still movable; it was customary to use it only for certain festivals of the year. The *Pala d'Oro*, in S. Mark's, Venice, is a reredos of this description. With the middle of the 16th century, the fixed reredos came into use.

In England it assumed early a more definitely architectural character, and was covered with elaborate Gothic detail—niches with figures of angels or saints,



Reredos in Winchester Cathedral, probably begun in the 15th century, and restored 1884-91

tabernacle work, and symbolic carving of every kind. The 14th century reredos in Durham cathedral, the 15th century in the chapel of All Souls, Oxford, and the one at Winchester are fine examples of this architecture. *Pron.* rear-doss. *See* Altar.

Reschen Scheideck. Alpine pass of the Italian Tirol. On the road from Landeck to Meran, alt. 4,902 ft., the pass is near the village of Reschen, and $3\frac{1}{2}$ m. S. of Nauders, near the Gruben Joch, where Switzerland and Italy meet. The road is often called the Finstermünz Pass, but this point lies some 2 m. N. of Nauders. The route was known in pre-Roman times.

Rescript (Lat. *rescripta*, written back). In Roman law, a written answer sent by the emperor to magistrates and other officials who applied to him for information and advice, and, less commonly, to parties in a litigation who similarly appealed to him. Rescripts differed from *decreta*, which were decisions upon doubtful points of law referred to the emperor as the highest court of appeal, but with the *decreta*, the *edicta* (ordinances with regard to matters in which new legislation seemed to be required) and the *mandata* (instructions to magistrates), formed the four classes of *constitutiones principum*, imperial constitutions, which had the force of law. The rescripts were preserved by Justinian in his Institutes. Rescript is the technical term for a decretal epistle from the pope on points of doctrine or discipline. *See* Decretal.

Rescue (Lat. *re*, away; *excutere*, to shake out). Deliverance from danger or violence. The word is used for the forcible release of a prisoner which is an offence against the law (*v.i.*); also for relief from a violent death. Rescue appliances are provided in case of an explosion in a mine or disasters at sea; fire brigades come into the same category. Heavy and light rescue squads for the recovery of air raid victims were maintained by the Civil Defence (*q.v.*) organization of the Second Great War. Rescue work is a term used for the efforts to dissuade women from the career of prostitution. A great deal of this is done in large cities by the Salvation Army and other social and religious agencies, and there are many so-called rescue homes. *See* Air-Sea Rescue; Fire Brigade; Lifeboat Institution; Life-Saving Society; Salvation Army.

Rescue. In law, taking away and setting at liberty out of the custody of the law either a person who is in the custody of the law or a distress rightfully taken. Rescue is a misdemeanour. But if a private person arrest another, it is no offence to rescue him unless the rescuer has notice (knowledge) that the person rescued is lawfully in the custody of such private person. The form in old English law-books is *rescous*.

Rescue Ship. Vessel employed in the Second Great War to rescue survivors from ships sunk in convoy. Convoy organization prevented ordinary vessels stopping to pick up survivors. The rescue ships were cargo boats equipped with hospital and operating theatre, and were manned by merchant seamen and R.N.V.R. doctors and medical orderlies. The rescue ship always sailed behind the convoy.

Research. Literally, a careful examination of facts. In this sense it is carried out by scientists, historians, and other scholars, and universities give research scholarships and fellowships. The great impetus given to research during the Second Great War left its mark on a number of U.K. govt. bodies. The Dept. of Scientific and Industrial Research (*q.v.*) has many

sections, as has the Medical Research Council (*q.v.*); while "operational" research, a branch of statistics (*q.v.*), was applied to marketing, advertising, etc.

Resedaceae. Small family of herbs, natives of Europe, W. Asia, and Africa. They have alternate leaves, and small flowers in racemes. The fruit is a leathery capsule open at the top, containing numerous kidney-shaped seeds. The typical genus *Reseda* includes the garden annual, mignonette (*R. odorata*), with fragrant flowers, native of N. Africa. Dyer's-weed or weld (*R. luteola*), growing in Europe, W. Asia, and N. Africa, yields a yellow dye.

Reservation of the Sacrament. Act of retaining unconsumed a portion of the consecrated elements at the Eucharist for future use. The earliest reference to the practice is found in Justin Martyr (A.D. 150), who tells us that the deacons reserved "some of the Eucharistic bread and wine" for the use of members of the church who were not present at the communion service itself. Tertullian encouraged the custom, especially in cases where any reason existed (*e.g.* the necessity of fasting on certain days) for not partaking of the elements at the actual service.

The object of the reservation was to provide (1) for the needs of the sick, since in the absence of any order for private communion in early times they would otherwise have been deprived of the Sacrament; (2) for those who lived in isolated districts, where, owing to the absence of a regular priest, the Eucharist was infrequently observed; (3) for those who were prevented by persecution or other lawful cause from attending the Eucharist itself.

The council of Saragossa in 380 declared that "whosoever does not consume the Holy Eucharist given to him in church" is anathema. This prohibition, however, seems only to have referred to private individuals, and the custom of the clergy to reserve the Sacrament for the sick, and for use in sudden emergencies, seems to have been universal. At the Reformation, Protestantism for the most part abandoned the practice. Article XXVIII of the Church of England declares that "The Sacrament of the Lord's Supper was not by Christ's ordinance reserved, carried about, lifted up, or worshipped." Attempts have been made to revive the custom, but the court of the archbishops refused its sanction in 1899 by decreeing that "the

Church of England does not allow reservation in any form." The subject was again raised during the discussions on Prayer Book revision in 1927-28 and the fact that the Sacrament was reserved in some "high" churches caused considerable controversy in the 1930s and early 1940s. See Eucharist.

Reserve (Lat. *re*, back; *servare*, to keep). Term used in a military sense for troops kept back during an action for reinforcements or to use in emergency. It is usual for the commanders of units, brigades, divisions, etc., to keep local reserves, while there is also a general reserve under the direct orders of the commander-in-chief. In the Second Great War a strategic reserve was maintained in the U.K. for use on any front requiring reinforcement. Reserve is also used for the sailors, soldiers, and airmen who have passed through the ranks, but are liable to be called upon for active service in time of war. These men are called reservists. The strength of a fighting service may therefore be computed not so much by its serving personnel as by its reserves.

The British and most other leading navies maintain a reserve fleet, composed of over-age and unmanned vessels which can be brought back into service in the event of emergency. After the Second Great War, ships of the British and U.S. reserve fleet were kept fully stored and armed, the guns and other equipment being covered with protective cocoons of plastic material. This enables vessels from the reserve to be commissioned within a few hours, whereas those laid up on the basis previously existing frequently required some months of work before they were serviceable. In 1948, the British reserve fleet was actually stronger than the active fleet, many of its units being new vessels built during the Second Great War and completed after hostilities. See Army, British; Army Reserve; Landsturm; Landwehr; Royal Naval Reserve.

IN COMMERCE. The reserve is a term used by accountants to denote (a) charges against gross profits made in the books of account for possible losses or expenses (e.g. bad debts, unsettled claims, etc.) and for undemanded or unpaid expenses (e.g. income tax or rates, etc.); and (b) allocations in the books of net profits to such purposes as superannuation, development, rebuilding, dividend equalisation, etc., or for writing off intangible assets (e.g. goodwill), or unsaleable

items (e.g. preliminary expenses), or for such objects as the redemption of debentures. The term reserve fund is sometimes used instead of reserve, but it is strictly applicable only when an amount of cash equal to the reserve is invested outside the business to furnish the necessary amount to finance the particular purpose indicated by the reserve; e.g., the redemption of debentures or the renewal of a lease.

Reserved Occupation. Term used in the Second Great War to describe men and women whose civilian occupations were of national importance and excused them compulsory service in the armed forces. Certain workers in reserved occupations were not permitted to volunteer for active service above specified age groups. As the war proceeded and the shortage of military manpower became acute, workers in many occupations became de-reserved and liable for military service. At the beginning of the war, there were some 5,000 reserved occupations, but by 1945 these had been reduced to a few hundreds. Earlier reserved occupations were as diverse as dog breeders and market gardeners. The reserving and de-reserving of occupations was the responsibility of the ministry of Labour and National Service.

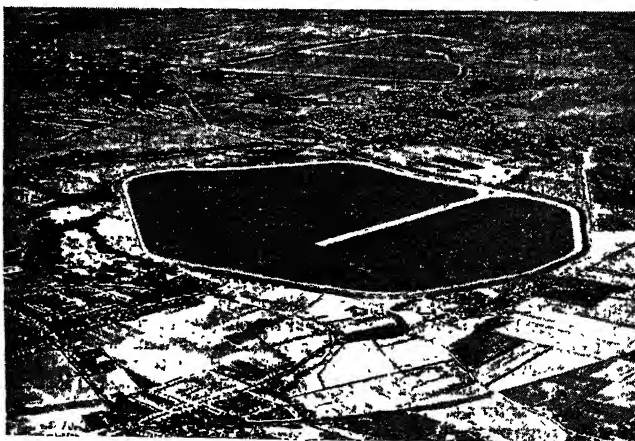
Reservoir (late Lat. *reservatorium*). Construction for the storage of water. Reservoirs are of three kinds: impounding reservoirs, formed by damming the course of a stream and creating a lake, or increasing the size of one already existing; storage reservoirs, into which unfiltered water is pumped, or conveyed by an aqueduct, to deposit suspended

matter; and service reservoirs, for filtered water. The last are small, covered in, and situated at a sufficient height above the area served to give a good pressure in the mains taking water from them.

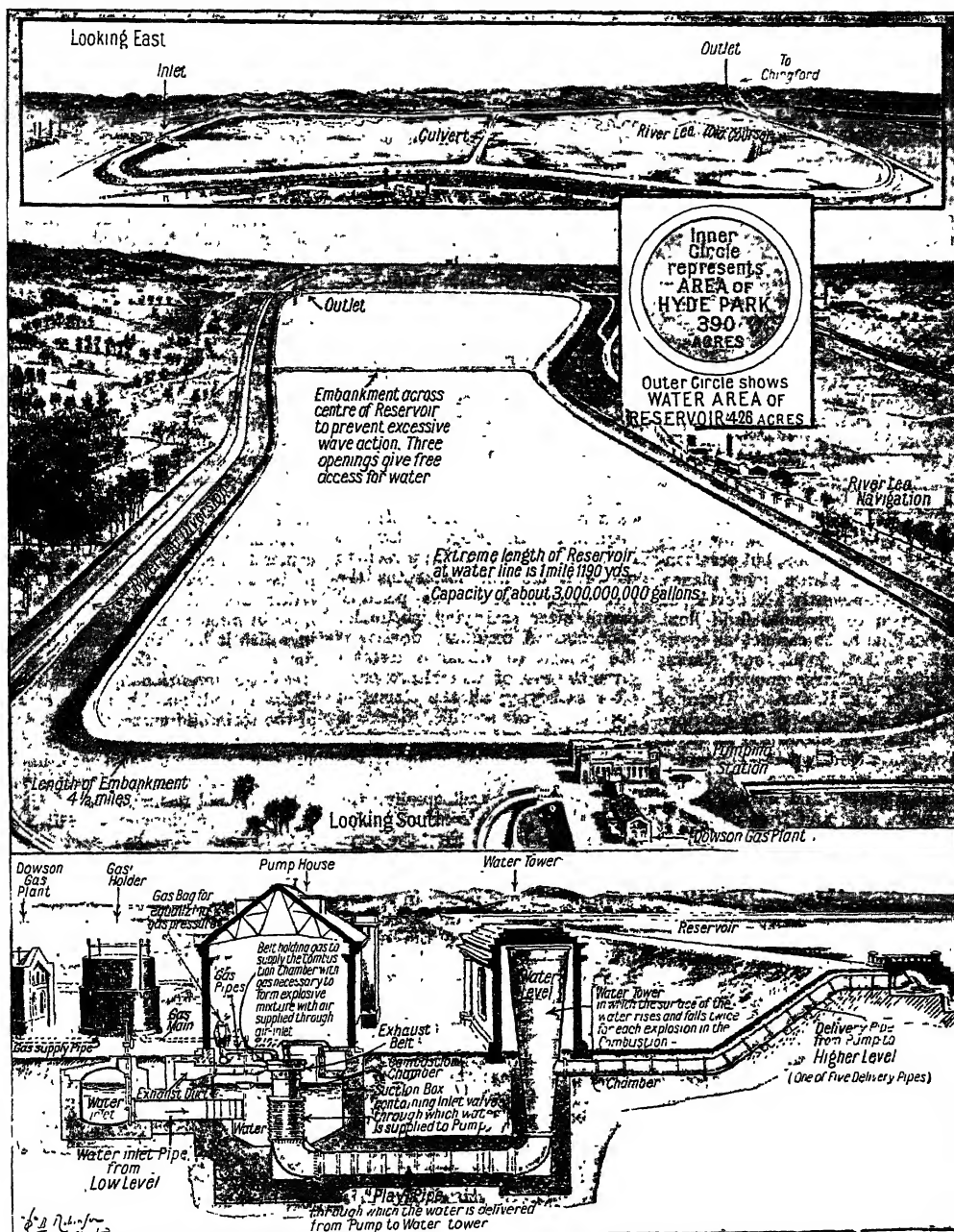
Impounding reservoirs, used either for irrigation or town supply purposes, are designed to collect a large part of the surface water from an extensive catchment area, and are often of enormous capacity. The Nile and the Roosevelt (U.S.A.) dams impound 450,000 million gallons each; the Marikanave dam (in India), 245,000 million; the Shoshone and the Olive Bridge dams (U.S.A.), 150,000 and 127,000 million respectively.

Most storage reservoirs are formed by damming a valley or depression, but others are wholly artificial, formed by the building of embankments round. One of the largest of this type is the Queen Mary reservoir, nr. Littleton, of the Metropolitan Water Board, London, which has a capacity of 6,750 million gallons. The bank is 4 m. in circumference, and the water area 723 acres. The containing embankments have core walls of puddled clay carried down to an impermeable stratum, and are constructed of material excavated from the area enclosed. The engineer balances the excavation against the embankment, removing only sufficient material for his purpose, while shaping the bed to throw all the water towards the outlet. Provided that the bed be self-draining, it need not be flat.

Service reservoirs for towns are lined with concrete or masonry and, in most cases, covered in to protect the water, which has been purified in filter beds, from contamination. The largest covered



Reservoir. Queen Mary artificial storage reservoir near Littleton, Middlesex, belonging to the Metropolitan Water Board



Reservoir. Diagrams of the Chingford reservoir which helps to supply London with water, showing how the river Lea was diverted, and the system of pumps which raises the water from the river level to that of the reservoir

reservoir in England is that at Honor Oak, in S.E. London, which has an area of ten acres and a maximum depth of 34 ft. The sides are retaining walls, backed by puddled clay. The whole of the bottom is covered by inverted arches of concrete, crossing one

another at right angles. At the points of intersection rise brick piers, which carry continuous brickwork arches running N. and S. and coated outside with a thick layer of cement. Above the cement is the clay and top soil originally taken from the site. At the point

of intersection of two walls, which divide the reservoir into four parts, are the valves by which water is admitted to and drawn off from each section independently.

One of the important factors to be considered in the construction of a reservoir is the maintenance

of a sufficient supply of water during periods of drought. This particularly applies to reservoirs which depend entirely upon the rainfall in a certain catchment area, and calculations are usually made on the assumption that there will be three consecutive dry years, when the combined rainfall does not exceed four-fifths of the average. The yield of the reservoir also depends on the area of the catchment, and the geological and physical characteristics of the neighbourhood. See Dam; Hydraulics; Water Supply, etc.

Reservoir Rock. In geology, a rock formation which contains water, natural gas, or crude oil in pores, cracks, fissures, etc. A reservoir rock must be extremely permeable. The most typical reservoir rocks are sediments—limestones, gravels, sands, and sandstones. Normally the permeability of fine-grained sediments, such as shale, is too low for them to be good reservoirs, but occasionally bedding planes, joint planes, etc., are sufficiently well developed and open to promote fluid flow. Crystalline rocks can act as reservoir rocks if joints and similar openings are large enough.

Resht or Rasht. Town of Persia. The capital of the province of Gilan, it is about 150 m. N. of Teheran, with which it is connected by a fair caravan road. Silks are manufactured, and cattle, sheep, tobacco, rice, and fruit exported. It was occupied by the British in 1918 and by the Bolsheviks in 1920. Pop. 122,000.

Residence (Lat. *residere*, to sit down). Dwelling-house. In ecclesiastical law, residence is the condition on which an incumbent holds his benefice. In England it is the custom for one canon to be in residence at each cathedral.

Resident. Diplomatic official appointed to the capital of a state bound by certain obligations to the country to which he belongs. The rulers of such states have often been guided in international (and sometimes also in domestic) affairs by the advice of the resident. There were formerly British residents at the courts of the principal Indian princes, and Sir Evelyn Baring (Lord Cromer) at one time practically administered Egypt, though officially he was only H.M. resident and consul-general.

Residual Deposits. In geology, materials left after the underlying rock has been decomposed by weathering. They include soils, terra rossa, bauxite, and laterite (q.v.).

Residual Rays or **RESTRALLEN.** Radiation remaining after rays from a continuous source are reflected a number of times from the faces of crystals of the substance under investigation. This pronounced reflection of certain wavelengths is due to the strong forced vibrations set up when the frequency of the incident electromagnetic waves is the same as a natural frequency of vibration of the charged ions of the crystal. There are two main groups observed, both in the infra-red, that with a longer wavelength corresponding to vibrations of the positive and negative ions of the crystal lattice with respect to one another. The short wavelength group result from vibrations within the polyatomic ions.

Residue (Lat. *residere*, to remain behind). That which is left, the remainder. The word is used in connexion with wills and bequests. In English law, a residuary legatee is the person to whom a testator bequeaths the rest or residue of his personal estate after satisfying particular bequests. A residuary devisee is the person to whom a testator gives the rest of his real property, after satisfying all the claims of particular, or specific, devisees, and after satisfying all other claims on his real estate. See Will.

Resilience. Colloquially, the power of a body to recover after strain. In engineering, the work done in producing stress in a body within its elastic limits, or the work done by the body in regaining its original form. Thus, if 13 tons per sq. in. be the elastic limit of stress for a steel bar, and if the bar be subjected to any stress below 13 tons per sq. in., it will be temporarily deformed. It will, however, elastically recover its original shape and size when freed from stress, but if the elastic limit of stress be exceeded, the bar will be permanently deformed. The modulus of resilience of a material, or the maximum amount of strain energy per unit volume at the elastic limit, is a measure of its capacity for resisting shocks or blows.

Resin. Name given to viscous exudations from the bark of certain trees, applied also to synthetic preparations of similar nature. Natural resins which contain varying quantities of essential oil, usually harden in time, partly as a result of chemical change, and partly owing to evaporation of the essential oil.

Some, however, owing to the nature of the essential oil, remain pasty (elemi) or even liquid (balsam, e.g. Copaiba and Peruvian). The characteristic ingredients of the resins are an inert substance, resene, of which the chemical constitution is little understood, and complicated resin acids which are related to the terpenes, and thus to the essential oil with which they are associated. They are distinct from the gums, which are related to the starches (carbohydrates). While gums are soluble in water and insoluble in organic solvents, resins are insoluble in water, and at least partially soluble in organic solvents. When heated resins melt and burn with a smoky flame giving an aromatic smell, whilst the gums char and give an odour of burnt sugar. In the trade, however, resins are called gums and the trader a "gum merchant."

Much of the resin of commerce comes from tropical forests where it is collected by the natives, either from the trees or, in the form of fossil resins, from the soil in which it has lain buried, often for centuries. Sometimes the trees are intentionally wounded (tapped) and, notably in the case of the rosin and turpentine industry, the trees are grown, tapped, and eventually cut down according to a carefully designed scheme. The principal resins are:

(1) *Rosin* (Colophony). This is obtained from many species of pine. The exudation also contains about 20 p.c. of an essential oil—the turpentine of commerce.

Rosin contains over 90 p.c. of resin acids which can be combined with alkali (e.g. soda) to form soap. Combined with metallic oxides, such as litharge, it yields driers for paints and varnishes. Rosin with glycerine forms estergum, a substance which possesses most of the useful properties of rosin without the acidity that causes "livering."

(2) *Damar* (Malay, torch). Name for a series of resins produced by many species of trees in Indonesia; they are soluble in turpentine and in coal tar naphtha and other organic solvents. They yield clear, pale, glossy varnishes, sometimes called crystal varnishes, formerly much used for coating paper. The films, however, lack durability and tend to remain sticky to the touch, and damar varnish has been largely replaced by synthetic products.

(3) *Copals* (Mex. *copalli*, incense). The name applied to a group of resins which are import-

ant ingredients of oil varnishes. They contain much less resin acid than does rosin, and are soluble in linseed oil only when partially decomposed by heat. Their solubility and hardness vary widely. The trees producing them are very long lived, some probably 300 or 400 years old. Luzon in the Philippines was formerly an important producer, and the softer resins are still called Manila copals.

The most important varieties are generally known by the name of the port of shipment, e.g. Pontianak (Borneo), a very much valued resin, and Zambas (Celebes).

In the Belgian Congo the collecting, cleaning, and grading of copal resins has been highly developed. An important property of the Congo resin is that, like rosin, it can be combined with glycerine, the product, Congo-ester, being a resin of low acidity which can be readily incorporated in oil to give a series of varnishes and paint media of very high gloss and durability.

Resins of minor industrial importance include sandarac and mastic. Sandarac is obtained from certain species of Coniferae (*Tetraclinis*). Formerly used in making clear, hard varnishes for labels, cardboard, leather, etc., it has been to a large extent replaced by synthetic lacquers.

Mastic is produced by a tree which grows in S. Europe and N. Africa and closely resembles sandarac. The bulk still comes from the island of Chios where it has been collected since very early times. It was referred to by Pliny (A.D. 70). It is used as a protective varnish for oil paintings.

Dragons' Blood

Various other resins are, or have been, used in medicine and as incense. Gum benzoin, which comes from Siam and Sumatra, is a typical incense resin. Dragons' blood is the name applied to several resins producing a red colour. Formerly much prized, dragons' blood was used by the great Italian violin makers of the 18th cent. The resin then used probably came from W. Asia and the island of Sokotra; the Arabs called it *dam-el-akhwain* and used it in medicine.

The elemies are soft, pasty resins which do not harden, exuded by many species of tropical plants. They have been used since very early times in medicine, but have been to a large extent replaced by synthetic products.

SYNTHETIC RESINS. These are synthetic products which fulfil

functions similar to those of the natural resins, namely the production of decorative and protective coatings. They form part of the group known as plastics. The product of the reaction between phenol and formaldehyde, introduced in 1908, could, while soluble, be applied as a varnish coating and then converted by baking to an insoluble and infusible form, thus acting as a stoving varnish. Later, oil soluble resins were made by including resin in the reaction. A further development was the use of higher phenols and aldehydes to give harder and more durable products. Glyptal resins made from phthalic anhydride and glycerine followed a similar line of development; and the alkyd resins are even more important than the phenolic type in the varnish and coating industries.

Urea with Formaldehyde Group

Another important group is that based on the condensation of urea with formaldehyde, which yields colourless resins. These are used to some extent in the production of synthetic finishes, but their main use is in mouldings where colour is important, particularly in synthetic cups, plates, etc. The vinyl, styrene, and methyl-methacrylate resins are transparent, and have optical properties which make them a substitute for glass; some of them are also used in the production of special coatings. The resins produced by polymerising coumarone—a constituent of coal tar naphtha—are used in coats where chemical inertness, particularly to alkalis, is important.

Synthetic finishes have the advantages that (1) they are consistent in quality; (2) they can be modified at will to produce specified properties; (3) they give finishes of great hardness, durability, and gloss retention combined with rapid drying.

MODIFIED NATURAL RESINS.

The competition of synthetic resins has led to the use of resin as a raw material for the production of an intermediate product which can be standardised. A typical method is to combine glycerine partly with resin and partly with an acid, such as phthalic acid, thus producing a combination of synthetic resins of the glyptal type and an ester gum. Oils and phenol-formaldehyde condensations can also be introduced by suitable technique.

Lac resin, the origin of which is described under Lac, is in many respects unique. It is cheaper than its potential rivals, and for

some purposes has, as yet, no completely satisfactory rival.

Dissolved in alcohol, lac resin forms the basis of a series of spirit varnishes and of french polish. On heating, it first becomes plastic and then permanently hard, infusible, and insoluble. It can, therefore, be used in making moulded articles, e.g. gramophone records, for which it has no equal on account of the fidelity with which it takes the impression, and the hardness and smooth finish of the surface. Before the Second Great War the record industry took more than 50 p.c. of the output. Lac resin also has excellent electrical properties. Lac used in aqueous alkaline solution (e.g. borax or soda) gives films which are waterproof when dry; such solutions form the basis of many waterproof inks and varnishes. See Glyptal Resins; Lacquer; Plastics; Turpentine; Varnish, etc.

T. Hedley Barry

Resina. Town of Italy, in the prov. of Naples. It stands on the Gulf of Naples, adjoining Portici (q.v.) at the S.W. base of Mt. Vesuvius, and is built on the lava-streams covering Herculaneum (q.v.). The starting place of the electric rly. ascending the volcano, it has trade in the famous Lacrima Christi wine made from the vines grown on its slopes.

Resistance. In electricity, measure of the extent to which a conductor resists or opposes the passage of an electric current. It may be simply visualised as electrical friction. Just as the friction of water flowing in a pipe causes a loss of "head," or pressure, so the resistance of a conductor causes a drop in voltage. The practical unit of resistance is the ohm, the resistance of a circuit which permits a current of one ampere to flow when one volt is applied to it. The power lost in a resistance appears as heat, and the electric heater is an example of resistance deliberately introduced to obtain heat.

The resistance of a conductor depends upon the length (the longer the conductor the greater the resistance); the cross-sectional area (the larger a conductor is the smaller will its resistance be); and the material of which it is made. Iron, for example, has nearly six times the resistance of copper. Silver is the best conductor; copper, the next best, is almost universally used, although aluminium (having about 62 p.c. of the conductivity of copper) is also used, particularly for over-

head conductors where lightness is an asset.

Resistance is also used to a considerable extent in electrical control. In spite of the waste of power, it is often the most convenient method of adjusting the current flow. Such resistances take the form of spirals of wire, cast-iron grids, or blocks of carbon. In order to prevent confusion between the abstract quantity "resistance" and an actual piece of apparatus, it is nowadays usual to refer to a piece of apparatus having a certain value of resistance as a *resistor*, and to a variable resistance as a *rheostat* (*q.v.*). Most substances show an increase of resistance with temp., but carbon decreases. All metals have very low resistance at low temps. See *Electricity*; *Electric Power*; *Grid*.

Resistance Movement. Name given during the Second Great War to the groups of patriots in countries overrun by Germany who organized resistance to the occupying force. Their activities included the production and distribution of clandestine papers; sheltering R.A.F. personnel who had escaped from aeroplanes brought down over the Continent, and passing such fugitives back to the U.K.; sabotage in factories; hiding young fellow-countrymen called up for labour service in Germany; collecting and forwarding through British agents information about German military dispositions, inventions, and industrial programmes; and, after the Allied invasion of Europe, blowing up bridges, rly. lines, etc., and active warfare as underground armies. Thousands of French, Belgian, Netherlands, Polish, Greek, Yugoslav, Norwegian, and Danish men and women enrolled in resistance organizations; and Italians developed a strong movement in the N. after Italy became a co-belligerent of the Allies in 1943. Hundreds of resistance workers were caught and sent to concentration camps; many were tortured, shot, or hanged. See under *Belgium*; *Denmark*; *France*; *Greece*; *Italy*; *Maquis*; *Netherlands*; *Norway*; *Poland*; *Warsaw*; *Yugoslavia*.

Resistencia. City of Argentina and capital of the Chaco territory. It stands on the Parana river, but its port is at Barranqueras, 4 m. E. It is connected to Santa Fé by rly., and served by river steamers. It is a centre for trading in cattle, cotton, skins, and timber. Pop. 50,000.

Res judicata (Lat., - thing judged). Term in general use in law. It means a dispute or matter which has been finally and decisively adjudicated upon by a competent court, so that it cannot be reopened. It is a matter of high legal policy that when once a question has been tried and finished it shall not be reopened; otherwise there would be no end to litigation. The plea of *res judicata* is conclusive; but it applies only when the person who brings a fresh suit is really trying to rake up the identical matter that was determined in the previous case. *Res Judicatae* is the title of a book of essays by Augustine Birrell (*q.v.*).

Resolution. Literally, something that is decided upon, and therefore meaning determination and steadiness. In a narrower, but derived sense, the word is used for a proposal put in definite terms before a public meeting or a committee. The house of commons sometimes declares its will in resolutions, but these are not laws until embodied in an Act of parliament. See *Chairman*.

Resolution. In music, the necessary progression of a discord to an adjoining note so as to complete the grammatical sense. Here F is the discord which resolves upon E. The term is also applied to the progression of the chord containing the discord.

Resolution of Forces. Process in theoretical physics. Two forces OA and OB acting at a point O may be represented, if drawn to scale, by two sides of a parallelogram, and the direction in which a particle moves will be given by the diagonal OC of the parallelogram. Conversely a force applied in the direction OC may be resolved into two forces given in magnitude and direction by OA and OB. This latter process is known as the resolution of forces. The resolved part, in any direction, of a force F is given by $F \cos \theta$ where θ is the angle between the force and the given direction.

Resonance (Lat. *resonare*, to sound back). Production of vibrations in a body by the action of a periodic force which has the same period of vibration as the natural period of the body. It occurs frequently in sound. If, for example, two tuning forks of the same pitch are held near each other, and one is sounded, the sound waves sent out

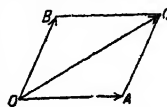
by it will strike the second fork, and cause the latter to vibrate in unison.

Resonators are commonly used to increase the apparent intensity of the sound of the particular pitch to which they respond, but the sound dies away more rapidly. The sound of a tuning fork may be increased by a resonator in the form of a hollow box, or of a pipe closed at one end, open at the other, the air column of which has a natural period of vibration equal to that of the tuning fork—that is, its length is equal to one-fourth of the wavelength of the note given by the fork. If now the sounding fork is held near the open end of the pipe, the column of air in the pipe, being a natural resonator to the fork, will be set in vibration.

If the open end of the pipe is fairly large, the vibrations of the column of air will set the external air in motion more powerfully than the fork did by itself, and the intensity of the sound will be much increased. The vibration of such columns of air in pipes is made use of in many musical instruments. The sounding board of a piano or the body of a violin are also examples of resonators, increasing the natural volume of sound. Electric resonance occurs when an electrical circuit has a natural period equal or nearly equal to the period of the source of impulses or alternating electromotive force. See *Radio*; *Sound Reproduction* and *Amplification*.

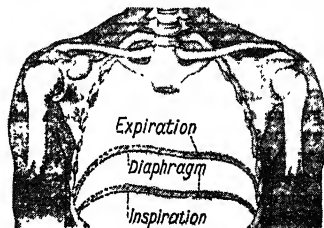
Resorcinol OR **RESORCIN** ($C_6H_4O_2$). White crystalline substance obtained by the interaction of fused sodium hydroxide and sodium metabenzene-disulphonate, or it may be obtained by fusing certain resins with caustic potash, or by distillation of Brazil wood extract. Resorcinol appears as colourless crystals soluble in water and alcohol. From it are prepared a number of dyes. It is used in medicine occasionally in certain skin affections, as a lotion or with glycerine. Hexylresorcinol is used as an antiseptic.

Respighi, OTTORINO (1879–1936). Italian composer. Born at Bologna, July 9, 1879, he studied composition with Rimsky-Korsakov in St. Petersburg (Leningrad) and with Bruch in Berlin. He became famous for an arrangement of pieces by Rossini which Diaghilev presented in 1919 as *La Boutique Fantasque*. The operas *Belfagor*, 1923, and *La Fiamma*, 1934, were well known abroad, and symphonic pictures of Rome



were popular in England, *e.g.* Le Fontane di Roma, 1916. Music for the ballet, *The Birds*, is by Respighi. He became professor of composition at the royal school of S. Cecilia, Rome, 1913, succeeding as principal in 1924. He died April 18, 1936.

Respiration. Process which leads to the liberation of energy within the body of a living organism. The most widely known form of respiration involves the intake of oxygen and the giving out of carbon dioxide, an exchange of gases which in higher animals is usually spoken of as external



Respiration. Diagram illustrating the movements of the diaphragm during respiration

respiration, in contrast to internal (or tissue) respiration. In this latter process energy is actually released within the cells. In higher animals the lungs, chief organs of external respiration, are inflated when downward contraction of the diaphragm (abdominal respiration) and upward movement of the ribs (thoracic respiration) cause enlargement of the chest, to be deflated by reverse changes. Marine animals breathe by means of gills. In most higher plants gaseous exchange occurs between the atmosphere and the intercellular spaces, mainly through the stomata of leaves and young stems and the lenticels of woody stems and roots.

In man the organs through which respiration is effected are the air passages, composed of the larynx, trachea and bronchi, and the lungs, the structure of each of which is described under its appropriate heading. The movements of the thorax are caused by certain muscles which, by contracting, bring about an increase in the volume of the chest cavity. The lungs expand with this increase of volume, and air is drawn into them through the air passages. This is the process of inspiration and is a muscular act. The respiratory muscles now relax, and the elastic recoil of the chest and lungs expels the air. This is expiration, and in ordinary quiet breathing entails no muscular effort.

The ordinary muscles of respiration are: (1) the diaphragm, which is dome-shaped and forms the floor of the thoracic cavity. On contraction the diaphragm is drawn downwards, and the vertical diameter of the chest is increased. (2) The intercostals, or muscles between the ribs. The upper ribs being fixed by the muscles of the neck, the contraction of the intercostals raises the lower ribs and enlarges the lateral and anterior-posterior diameters of the thorax.

In extraordinary or forced inspiration, such as occurs when there is obstruction to the entry of the air, or in coughing, additional muscles come into play, particularly the sterno-mastoid, serratus magnus, pectoral, and trapezius muscles. In forced expiration the abdominal muscles also contract and, by pressing on the viscera, push up the diaphragm and thus help to expel the air from the lungs. In men, the respiratory movements are most marked in the lower part of the chest and the abdomen (inferior costal type). In women, the movements in the upper part of the chest are more marked, and those of the lower part of the chest less obvious (superior costal type). The lungs are not completely emptied at the end of each expiration.

The following terms are used for the quantity of air breathed or in the lungs: Tidal air is the amount ordinarily breathed in and out, and in a healthy adult man is about 30 cu. ins. Complementary air is the amount in addition to the tidal air which can be drawn into the lungs by the deepest forced inspiration, and is on the average 100 cu. ins. Reserve or supplemental air is the amount over and above the tidal air which can be expelled by deep forcible expiration, and is about 100 cu. ins. Residual air is the amount which still remains in the lungs after the most violent expiratory efforts, and amounts usually to about 100 cu. ins.

Rate of Respiration

The effect of continuous muscular effort, as in running a race, is greatly to increase the amount of air inhaled and exhaled at each respiration, and the establishment of this process is popularly known as "getting the second wind." The rate of respiration in a healthy adult is from 14 to 17 per minute. It is increased by exercise, febrile conditions, and certain diseases of the lungs. The total quantity of air inhaled and exhaled during 24 hours by a healthy adult varies from 400,000 to 650,000 cu. ins.

Regulation of the rhythmic movements of respiration is controlled by a respiratory centre in the brain, by the vagus nerves, and by the chemical condition of the blood.

Cheyne-Stokes respiration (*q.v.*) is a condition in which the breathing gradually becomes deeper for a brief period, and then shallower until it almost ceases.

Artificial respiration is explained in a separate article.

Respirator. Device to enable breathing to be maintained in an atmosphere poisonous or otherwise harmful; to provide breathable air where no atmosphere exists; or to enable medicated vapours to be inhaled.

Industrial respirators are of various types, but basically they consist of a mask covering the mouth and nostrils and fitted with a filter. For breathing in a dust-laden atmosphere the air is filtered through fine gauze, and if steel particles are present the gauze is magnetised. Respirators for use in atmospheres containing carbon monoxide are self-generative. Compressed air and oxygen, stored in cylinders strapped to the wearer, are drawn through a valve to lower the pressure, and then inhaled. The exhaled air is blown through a valve into a chamber where it is filtered by soda lime or other absorbent and returned to the breathing circuit. Thus the same air is breathed several times over. The self-generative respirator is used by firemen working in smoke, mine rescue parties, and divers in free diving-suits.

Respirators which supply oxygen are used by the crews of high-flying aircraft. In this respirator the exhaled air escapes to the atmosphere and the respirator ceases to function after the oxygen cylinder is exhausted. A similar respirator is worn by divers in non-self-contained suits. Air from the surface is forced down a tube and through a valve into the helmet, the exhaled air escaping through an outlet valve.

Military respirators were introduced in 1915 following the first use of chlorine gas by the Germans that year. They consisted of a flannel bag to cover the wearer's head, the ends being tucked into the neck of the tunic. The bag, which was provided with a mica window, was impregnated with sodium carbonate, which combines with chlorine and purifies the air passing through it. Later, when the Germans commenced using phosgene, the flannel was impreg-

nated with sodium thiosulphate and sodium phenate, and fitted with a valve through which the exhaled air was released to the atmosphere.

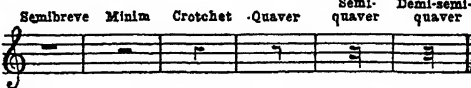
The advent of gas shells, which released high concentrations of a wider range of toxic materials, led to the introduction of the box respirator. This consists of a close fitting mask connected by a flexible tube to a box containing alternate layers of active absorbent charcoal and pumice impregnated with sodium carbonate and hexamethylenetetramine. As each new war gas was developed filters capable of rendering the respirator resistant were added.

Shortly before the Second Great War, respirators were issued to the civilian population of Great Britain as protection against gas. The civilian respirator was

basically the same as the military type, except that the filter was incorporated with the mask; when it was thought in 1940 that the enemy might use arsine, civilian respirators were fitted with a special filter. Children's respirators were made in the shape of animal heads, and a hood respirator was introduced for infants. Civilian respirators, unlike the military type, did not permit the wearer to engage in active work. Although poison gas was not used in the Second Great War, a new military respirator was issued to the British forces in 1944; this incorporated the filter with the mask.

Military respirators are not made to be resistant to coal gas.

There are a number of respirators used for medical purposes, particularly for inhaling vapours in the treatment of catarrh and asthma. The iron lung (q.v.) is a form of hood respirator used to induce normal breathing artificially. See Chemical Warfare.



Responsibility. Term used in English law, in contracts and statutes. In leases it is frequently provided that the lease shall not be assigned except to a respectable and responsible person. The word here means a person who has the necessary means to pay the rent and satisfy the other lessees' obligations. Carriers of goods sometimes stipulate that they will not be responsible for certain articles (e.g. livestock and perishable goods). Such stipulation covers both loss of and damage to the goods.

Rest. In music, sign to indi-

cate silence. Rests are of different values corresponding to the various notes (see illus. above). They may be dotted, but never twice-dotted. Silence for a whole bar, whatever the value, is usually shown by a semibreve rest.

The word is used by the Bank of England and other banks for their reserves, while another meaning is for that part of a lathe which supports the cutting tool.

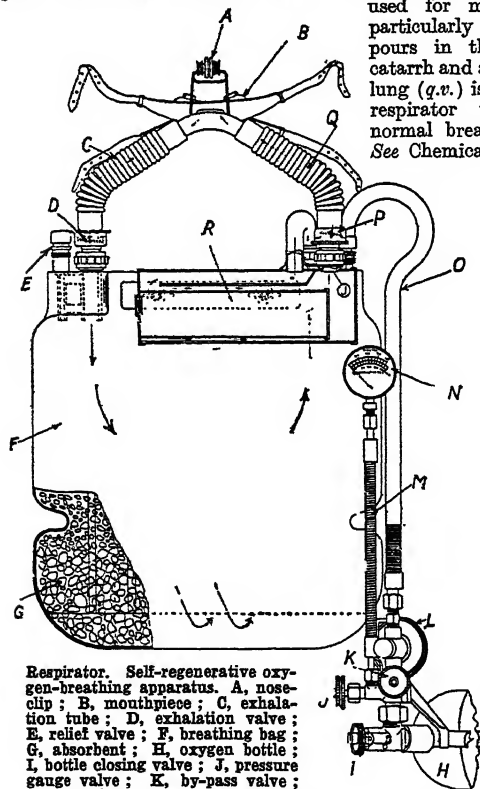
Rest-and-be-Thankful.

Name given to the summit of a steep pass in Argyllshire, Scotland, the words being inscribed on a stone seat. The road running W. from Arrochar through the desolate Glen Croe ascends by zigzags some 860 ft. above sea level, giving a magnificent panorama from the top. Wordsworth wrote a poem on the place.

Restaurant (Fr. *restaurer*, to restore). An establishment where meals are provided. Popularly, there is now little distinction between a restaurant and a café, but the term restaurant was originally applied only to an establishment making a speciality of some particular dish, as distinct from the café, inn, or eating house which offered a general bill of fare.

The first restaurant to be called such was established in 1765 in the Rue des Poulies, Paris, by a café-keeper named Boulanger. His speciality was soup and entrées, and he kept a good cellar. By lavishly decorating his premises, providing a clean table-cloth for each diner, and charging high prices, he was able to restrict his clientele to a circle of socially eminent persons.

Boulanger was followed by a number of imitators, but the restaurant era did not begin in earnest until the French Revolu-



Respirator. Self-regenerative oxygen-breathing apparatus. A, nose-clip; B, mouthpiece; C, exhalation tube; D, exhalation valve; E, relief valve; F, breathing bag; G, absorbent; H, oxygen bottle; I, bottle closing valve; J, pressure gauge valve; K, by-pass valve; L, reducing valve; M, flexible tube; N, pressure gauge; O, oxygen supply tube; P, inhalation valve; Q, inhalation tube; R, cooler. Arrows indicate direction of air flow. The wearer exhales through the valve D, the air passing down one partition of the breathing bag and through the absorbent; it then passes up the other partition to the reducing valve L, where it is mixed with fresh oxygen from the bottle H. The pressure gauge indicates the quantity of oxygen in the cylinder and duration of supply. The by-pass valve K is for use in the event of the reducing valve failing, and enables the wearer to breathe directly from the oxygen bottle

Courtesy Siebe, Gorman

tion, when many of the chefs from the homes of the aristocracy lost their positions and opened restaurants. Among these restaurants were that of Legarocque in the Jardin des Tuileries, where Marat and Couthon hatched their plots; the Café Royal, established in 1808; Beauvilliers Restaurant, founded by the ex-chef to the Prince de Condé; and Robart's, opened by the ex-chef to a farmer-general of taxes. Later, and equally famous, Paris restaurants still existing are the Maison Dorée, Restaurant Peter's, Café Riche, Champeaux Philippe, Café Durand, and La Tour d'Argent. These base their charges on the à la carte system, payment being according to the actual meal chosen.

One of the first restaurants opened in Great Britain was at Whiteley's, London, in 1873, mainly for the benefit of the store's customers. Many of the best-known London restaurants were opened in the last two decades of the 19th century. Among the most notable now existing are Frascati's, Simpson's, the Café Royal, Rule's, Oddenino's, and the Holborn. Many of the larger hotels also began to cater for non-residents, and for many people with money to spare a restaurant dinner became the normal way of starting an evening's entertainment, and a restaurant supper the recognized way of finishing it. In time, many of the French and Italian waiters employed by the large restaurants opened establishments of their own, chiefly in Soho, where they provided good food and wine tastefully served at prices which were not exceptionally high.

Although most good English restaurants follow the French à la carte system, a number introduced a table d'hôte service, which charges a fixed price for a specified meal, excluding drinks. In England, the distinction between café and restaurant has become increasingly difficult to define, but in general the café serves snacks as well as full meals and is not licensed for the sale of intoxicants.

During the Second Great War, and for some years afterwards, food control and rationing necessitated restrictions on the variety and amount of food consumed in restaurants. Each diner was restricted to three courses; bread or rolls counted as one course, 1946-48. The maximum price of a restaurant meal was fixed at 5s., but proprietors were permitted to add a cover charge, the maximum

for this being 7s. 6d., to meet the cost of orchestra and other amenities, and a surcharge. No limit was fixed to the amount spent on drinks. See Café.

Rest Harrow (*Ononis spinosa*) OR WILD LIQUORICE. Shrubby dwarf perennial of the family Leguminosae. It is a native of



Rest Harrow. The flower of this perennial, left, and the fruit, right. Top, the plant

Europe, W. Asia, and N. Africa. It has a creeping rootstock, above or below ground, whose rooting gives it so firm a hold that it was said to arrest the plough or harrow in its progress. The leaves are undivided or broken up into three leaflets. The flowers, similar to those of the furze, are pink with red streaks. The fruit is a small pod. In dry soils the stems become more erect and develop spines.

Restigouche. River of New Brunswick, Canada. It rises in the hills in the W. of the province, flows N.E., and then turning E. forms the boundary between Quebec and New Brunswick. It is 225 m. long, falls into Chaleur Bay, and is navigable for large vessels for about 20 m. The name, of Indian derivation, means "the river in the shape of a hand," the reason being that it has five main arms.

Restitution (Lat. *restituere*, to set up again). Act of restoring something taken away, or making good. The restitution of conjugal rights is a phrase used in English divorce law. A husband or wife whose spouse refuses to cohabit may obtain a decree for the restitution of conjugal rights, whereby the spouse is ordered to return to

cohabitation within a fixed time. If the respondent disobeys the order he or she is not punished, as was formerly the case, but disobedience constitutes desertion. See Divorce.

Restoration, THE. In English and Scottish history this term means almost always the restoration of Charles II in 1660. In France it refers to the restoration of the Bourbons in 1814. The so-called Restoration period in England embraces the years after 1660 when, in morals and literature, there was a reaction from the austerity of the Puritan rule, which showed itself in licence and even indecency. A group of playwrights who came into prominence at this time, Congreve and Wycherley being the best known, are usually called the Restoration dramatists.

The restoration of Charles II was the work, not of Monk, but of events. After his romantic escape from Worcester, Charles had been an exile from England. In all three countries, however, especially in Scotland and Ireland, he had many supporters, and the harshness of Cromwell's rule added to their number. Risings, notably that of Glencairn in Scotland and Penruddocke in England, broke out in his favour; earlier Montrose had campaigned brilliantly for him. But as long as Cromwell's military genius and the trained valour of his Ironsides were available, all hope of a Stuart restoration seemed vain.

With Cromwell's death the position was wholly changed. His son Richard proved a weakling, and soon retired into private life. In 1659 the royalists arranged a rising, and, to take advantage of its anticipated success, Charles moved from Brussels to Calais. But the effort failed; concerted action was wholly lacking, and only in Cheshire was the movement at all serious. The king's friends were not successful until early in 1660, when Monk (see Albemarle) had been some weeks in London, and plans for a stable government had failed. By Sir John Grenville, Monk sent a verbal message to Charles, advising him to promise oblivion for past offences and religious toleration; also to move to Breda (*q.v.*), and there await events.

The declaration of Breda, drawn up on these lines, followed, and a convention parliament met. To this Charles sent a letter which was read on May 1. The members professed their loyalty to their

king, as they now called him, and declared that their lawful and ancient government was by king, lords, and commons. On May 8, Charles was proclaimed king in London; on the 16th he received at The Hague a deputation of lords and commons, asking him to return, and on the 23rd he went on board the *Naseby*, the flagship of the fleet sent for him. Amid great rejoicing, he landed at Dover, held a council at Canterbury, and on the 29th, his birthday, he travelled from Rochester to London, where the people welcomed him with wild excitement. Scotland followed the example of England, and a parliament in Edinburgh restored the monarchy. Ireland was bound by the act of the English parliament. See Charles II; England; History.

Restoration. In architecture, the process of repairing or reconstructing a building so that it shall retain or regain its original character. Restoration is almost wholly a modern art; prior to the 19th century a building that had become seriously dilapidated was either patched up in accordance with the utilitarian needs and fashion of the day, or replaced by another of a totally different kind. The educational or aesthetic value of a medieval or Renaissance structure was never considered. In the 18th century, when the decadence of the Renaissance style had reached its limit, a mild interest was awakened in the earlier forms of building, and in Great Britain the dilettante headed a kind of Gothic revival. Wars, however, and the industrial revolution deferred the question of restoration till early in the 19th century.

A movement for the better understanding of the principles of medieval architecture was then set on foot by the Camden Society, while in 1840 the newly-formed Ecclesiological Society turned its attention to explaining the usages of the pre-Reformation Church in the light of Gothic fittings and ornaments. Meanwhile Pugin (*q.v.*) had started his crusade for the resuscitation of Gothic; and restorations along this line proceeded with a rather too feverish haste. They passed finally under the control of a small band of Gothic purists who, not content to restore a church as it had been before, pulled down or mutilated those parts which did not accord with the period in which the remaining parts were built. The British Society for the Protection of Ancient Buildings, formed under Morris's influence in 1877, has since

done much to improve the character of restorations, while in France the Commission des Monuments Historiques has performed similar invaluable service.

Restorationists. Term applied in Church history to those followers of Origen who held that all sinners will ultimately be forgiven and received into God's favour after a period of purgation in the next world. This is distinct from the R.C. doctrine of purgatory. The name has been used also for an American sect of Universalists, founded about 1818 by Hosea Ballou at Boston. He taught that sin is entirely connected with the body, and that the article of death, by freeing the soul from the body, sets it free also from the consequences of sin. His followers separated from the Universalists and formed a definite sect in 1831.

Restraint (Lat. *restringere*, to draw back). Literally, the act of hindering or limiting. Restraint of marriage is a restriction attached to a bequest forbidding a devisee to marry. The law of England, we are told by ancient writers, looks on marriage with favour—no doubt as much for political as for moral reasons. A married man is more likely to be a good citizen than a single one. Therefore gifts given upon conditions restraining marriage will generally be held to be given as if such conditions had not been made. Thus, a devise of an estate to A, but if A marries then he is to lose the estate, is bad. It can, however, be expressed another way. If the gift is "I devise Blackacre to A; but upon A's marriage or death then Blackacre is to go to B," it is quite good. So it is quite lawful to bequeath an income to a woman during her widowhood; but in a gift of the same income to a widow, with a condition that she shall lose it on re-marriage the condition is bad, as being in restraint of marriage.

By the law of England an agreement in undue restraint of trade is bad, as being against public policy. By such an agreement is meant one whereby a person binds himself to exercise his trade, profession, or calling in such a way as to fetter himself unduly. And the reason why such an agreement is void is because it is to the public interest that all men shall be free to work and carry on business.

Agreements of this kind are, in the main, of two kinds: (1) When an employee, as part of his agreement of service, contracts that after his service is terminated he will not carry on the same kind of

business or enter the service of another employer in the same business within a certain area. (2) When a man sells a business and agrees that he will not carry on a competing business, generally within a certain area. In both these cases the agreement is void if it is unreasonable, i.e., if it is more than is reasonably necessary to protect the promisee. This depends on the kind of business. Thus, a grocer's assistant who agreed not to take a similar situation within 20 miles of his master's shop has probably contracted unreasonably. But a solicitor who has sold his practice with a covenant not to practise within 20 miles may have contracted reasonably.

Formerly property could be settled on a married woman with a restraint on anticipation, preventing her using the capital or future income. This was abolished in the U.K., partially 1936, entirely 1949.

Restriction of Output. The deliberate limitation of what is produced during a certain period, by workpeople, by individual businesses, by groups of businesses, or by a whole industry.

Restriction of output of all these types was a common feature of world industry during the period 1920-35. Restriction of output by employees was practised and may still be practised for the following reasons: (a) fear of unemployment, to make the work last longer—this type would disappear if full employment were maintained; (b) fear of worsening piece-work rates or increasing the severity of working conditions—those who worked to their utmost to earn as much as possible used to be called "rate-busters" in the early 20th century, before the technique of rate-fixing had been improved; (c) hostility to supervisors, the management generally, or to the notion of "making profits for shareholders." Restriction of output by those in charge of businesses may reflect (a) the desire to maintain a high level of profit through artificial scarcity; (b) the process "rationalisation," i.e. the maintenance of a profitable ratio between existing demand and the supply; (c) the need to adjust the supply to a diminished demand. The converse of restriction of output is a "policy of plenty," where the emphasis is placed not on the acceptance of existing demand but on the expansion of demand by all means possible, and the satisfaction of the expanded demand by the full utilisation of productive resources.

Resultant Tones. Acoustical phenomenon produced by the simultaneous sounding and sustaining of two loud notes. Differential tones are according to the difference of vibrations between the generators. Thus, in the case of a fifth, the relative proportions of which are 2:3, the differential tone will be equal to 1, i.e. an octave deeper than the lower generator. It is on this principle that the acoustical bass of some organ pedal stops is produced. Summational tones, on the other hand, are the result of the sum of the vibrations. Resultant tones, which are more subjective than objective, were first noticed by the violinist Tartini in 1714, who taught his pupils to apply them as a test of accurate tuning. He called them *Terzi Suoni* or Third Sounds.

Resurrection (Lat. *resurgere*, to rise again). Term specially used of rising from the dead, also applied figuratively to the revival of anything in a state of decay. Every spring witnesses a resurrection, the renewal of the life of nature, to which winter had brought death. In many religions there are myths of resurrection, the descent of a god or goddess to the realms of darkness, and the ascent again to the world of light.

The conception meets us in the O.T., first of all, in the two records of restoration of life by a prophet (1 Kings xvii, 20-24; 2 Kings iv, 32-37). It is applied figuratively to the nation's restoration from Divine judgement to Divine favour (Hosea vi, 1-3). To the hope of national restoration there attached itself the hope of individual restoration from death to life. It seemed an intolerable thought that those who died before "the day of the Lord" should have no share in its blessings, and so the belief arose that the good and godly would be raised up even from the grave (Isaiah xxvi, 19). This belief was afterwards extended to include the bad as well as the righteous (Daniel xii, 2); the one class to be consigned to eternal punishment, the other to be blessed with eternal life.

Doctrine of the Last Things

There can be little doubt that Judaism was strongly influenced by the corresponding doctrine of Zoroastrianism, in which there is a very detailed eschatology or doctrine of the last things. In the Apocryphal and Apocalyptic writings the doctrine of the Resurrection assumes a much more definite form. In some of these writings only the resurrection of the righteous is taught, in others of the wicked as well. In 2 Maccabees vii, 11, the martyr expects to

receive back the tongue and hands of which he had been deprived on earth. In Enoch v, 16, a contrast between present and future conditions is asserted; the garments of life given at the Resurrection will not grow old.

The Sadducees regarded this development as an illegitimate innovation, but the Pharisees accepted it (Acts xxiii, 8). How completely the latter expected the restoration of earthly conditions at the Resurrection is seen in the problem regarding the woman with seven husbands which the former submitted to Jesus for solution (Matt. xxii, 23-33). Jesus in His answer censured the Sadducees' rejection of the belief in the future life in communion with God; but no less did He condemn the Pharisaic literalism, and asserted a great change in the conditions of the future life. Paul no less insists on a continuity of life, but also on a contrast of its conditions, opposing to the natural the spiritual body (1 Cor. xv, 39-58).

The hope of the Resurrection is not, however, the mere survival of the soul after its escape from imprisonment in the body. In the Christian doctrine no material identity is affirmed between the body laid in the grave and the body raised, as has sometimes been assumed; that assumption is excluded by the teaching of Jesus and Paul. But what is unequivocally asserted is that the personality of which the identity is maintained will not be disembodied, but possess an organ of activity and communication, described as spiritual because adapted to spiritual uses as the natural body is not.

Second Advent

In the N.T. the Resurrection is closely connected with the Second Advent of Christ, and is expected in the immediate future. When some believers died before that much desired and eagerly expected event, Paul found it necessary to comfort the mourners with the assurance that the living at the Second Advent would have no advantage over the dead (1 Thessalonians iv, 13-18). In view of the predominance of the expectation of a speedy Advent, the N.T. is silent regarding the conditions of the intermediate state between death and the Resurrection. In the Fourth Gospel the ideas of judgement and resurrection are spiritualised, and yet the common Apostolic expectation is not abandoned. The teaching of Jesus, according to the Fourth Gospel, about the Father's house of many mansions (xiv, 1-3), has led modern Christian faith to assume,

without recognizing any departure from the prevalent teaching of the N.T., that Christ receives the believer at death, and that the glory and blessedness of heaven are at once possessed.

The divine seal on the human hope of resurrection is given in the fact of the Resurrection of Jesus (1 Cor. xv, 12-19). To conceive this fact as merely a survival of the soul of Christ is to ignore the consistent meaning of the word resurrection in the Old and the New Testament. To add the epithet spiritual does not justify such a wide departure from the usage. The N.T. teaches that Jesus was raised from the dead bodily. It is not at all necessary to assume any material identity of the body laid in the sepulchre with the body in which Christ appeared. It was with a spiritual body Jesus rose from the dead, and the relation between that and His natural body we may assume is described by Paul (1 Cor. xv, 51-52); by an act of God the one was changed into the other.

Gospel Evidence

On the belief in the Resurrection the faith of the Christian Church in Christ as Living and Reigning Saviour and Lord rests. The attempt to account for that belief apart from the fact, as in the vision hypothesis, has against it the amount and the nature of the evidence, the number and the character of the witnesses, in all of whom the necessary psychical conditions of vision cannot be assumed as present. The records in the Gospels of the appearances, while not contradictory, cannot be entirely harmonised; but they are not the oldest literary evidence. That is found in 1 Cor. xv, 1-11, written at a date so near the event itself as to preclude the growth of a myth, while Paul's conversion is the most striking proof of the presence and operation of the Risen Lord. See Incarnation; Jesus Christ.

Alfred E. Garvie

Bibliography Historical Evidences for the Resurrection of Christ, K. Lake, 1907; Critical History of the Doctrine of the Future Life, R. H. Charles, 1913; The Resurrection of the Flesh, J. T. Darragh, 1921; Do Dead Men Live Again?, V. F. Storr, 1932; And the Life Everlasting, J. Baillie, 1934; Is the Resurrection True?, D. F. Brundt, 1934; Conquest of Death, F. T. Lord, 1940; The Resurrection of Christ, A. M. Ramsey, 1945; The Gospel of the Hereafter, J. P. Smith, new ed., 1948.

Resurrection Bay. Inlet of Alaska, on the S.E. coast of Kenai peninsula. From the bay was launched in 1794 the first vessel built in Alaska (q.v.).

Resurrection Men. Term for men who made a practice of disinterring dead bodies, usually those just buried. They did this in order to sell them to medical students and others for dissecting purposes. They were known as body snatchers. In England the practice was prevalent between about 1760 and 1840. See Bodysnatching; Burke and Hare.

Resuscitation (Lat. *resuscitare*, to raise again). Revival of persons apparently dead from the effects of shock, e.g. electrical, suffocation, asphyxiation, syncope, etc. The commonest form of apparent lifelessness is that due to syncope or fainting. In such cases the feet should be raised and the head lowered. The recumbent position in all cases requiring resuscitation, indeed, is one of the first things which should be obtained. This should be followed by the loosening of any tight articles of clothing, e.g. collar, corsets, etc., which may impede respiration, and plenty of air should be allowed to reach the patient. In serious cases the heart action may be stimulated and respiration increased by sprinkling the face with water, or by the application of spirits of camphor or weak ammonia or smelling salts to the nostrils, and by giving a small dose of brandy or other spirit. In extreme cases artificial respiration (q.v.) and stronger restoratives must be resorted to in order to restore the sufferer.

Those suffering from electric shock should be revived by artificial respiration, and heat should be applied to the limbs. Brandy, strychnine, and other stimulants should be administered. In cases of poisoning from coal gas and carbonic dioxide, artificial respiration should be tried, and oxygen administered when possible.

Resuscitation of newly born babies cannot be attempted by the ordinary methods of artificial respiration. The baby must have air first of all introduced into its lungs, the best way being by direct insufflation from the mouth of the nurse, or other person present, a method practised by shepherds with newly born lambs from time immemorial. See First Aid.

Reszke, ÉDOUARD DE (1855-1917). Polish singer. Brother of Jean de Reszke, he was born in Warsaw, Dec. 23, 1855, studied singing at Milan and Naples, and became a leading bass at the Théâtre Italien, Paris, 1876, later joining the Opéra there. His bass voice had fine quality and training, and he acquired dramatic abilities.



Edouard de Reszke as Mephistopheles

and Paris, and died May 29, 1917.

Reszke, JEAN DE (1850-1925). Polish singer. Born at Warsaw, Jan. 14, 1850, he went to the university and studied singing in Italy. He appeared as a baritone in opera in Venice, 1874, London, 1875, and Paris, 1876. Turning tenor, he made a sensation by his performance in Madrid, 1879, and in Paris, 1883, in *Hérodiade*, and *Le Cid* of Massenet, and from 1888 to 1900 performed regularly at Covent Garden. His tenor voice was singularly pure and well controlled, and his Wagnerian performances were memorable. He played in the Paris Opéra before retiring through ill-health, 1904. He died April 3, 1925.

Retail Distribution. Process by which commodities are sold to the public. It is essentially concerned with the sale of consumable goods, and not with that of raw materials or capital goods to industrial consumers. Retail distribution represents the last stage in the distributive process of a commodity. The process may be long and complex, when for instance a commodity passes through the hands of wholesalers, merchants, or factors; when it has to be stored or processed before being sold to retail distributors; and when it has to be transported from far distances; but all these stages are simplified when a farm supplies milk direct to consumers or a baker sells bread to the neighbouring customers.

The bulk of the retail business is done in shops and performed by shopkeepers or companies owning stores, and their assistants. But a great deal is also done by other

outlets. There are markets and stalls, street vendors, barrow dealers, and hawkers; some farmers still sell fruit and vegetables from their carts to neighbouring districts; commercial travellers and agents sell household appliances retail on their home-to-home visits; manufacturers may even supply certain goods direct to private consumers, avoiding wholesalers and retailers, as when sports and games equipment is sold to clubs and other clients direct; even the slot-machine represents a non-shop facility.



Jean de Reszke as Lohengrin

Then there is the mail order business with its wide ramifications. The potential customer for one reason or another is in a position neither to see nor to handle the actual merchandise, and so the selling appeal has to be made to him by post, mostly through the medium of catalogues and press advertisements and also by sending small samples. The mail order organization has been mainly developed in the U.S.A., where the large distances favour it; in 1939 there were in the country 534 mail-order houses with an annual sale of \$537 millions. Service trades may also be connected with retailing, although they generally do not constitute shops. A barber occupies a shop, though he is not strictly a shopkeeper; yet he may sell cosmetics, toilet soap, razor blades, brushes, and combs, in competition with pharmacists or ironmongers; garages or petrol filling stations may sell motor car accessories; restaurants, which are not to be regarded as shops, may sell cigarettes and sweets and have a bookstall. The report of the census of distribution committee in 1946 drew attention to such non-shop channels of retail distribution.

A trial census of retail distribution was carried out for six British towns in 1936 by a group of business firms. It may be expected that the total for Great Britain will lie in the neighbourhood of 800,000-900,000 shops. There are probably two million shop assistants; the number of workers employed in the distributive trades in 1939 was stated to have been 2,900,000. The average number of shop assistants employed in retail outlets varies, according to Dr. Henry Smith, from 0.3 per shop in certain trades to over 2.0 in others. Sometimes in an urban district the shops situated in the centre of the town represent 75 p.c. of the total value of the turnover of the whole district, while 75 p.c. of the shops,

scattered in the suburbs, may represent not more than 25 p.c. of the value of the retail trade. Not merely the number of shops, but also their turnover, must be considered in order to assess their economic and social significance.

The number of single retail outlets is probably greatest in grocery and provisions (of which Dr. Smith gave an estimate of 92,700 retail outlets), followed by textiles and other clothing, meat, and green-grocery; but he also estimated the number of general and mixed businesses at 78,500. There are trades in which a population of less than 500 is on the average served by one shop, as with grocery and provisions, while with ironmongery, furniture, or boots and shoes the figure may well exceed 3,000, and be far higher with such expensive trades as that of motor cars. In spite of the increase in department stores and bazaars, the multitude of shops shows yet no sign of reduction, and with the extension of suburban dwellings and satellite towns there is little reason to expect any.

TYPES OF SHOPS. The main distinction is first between small, independent retail shops and the department and other big stores; independent retail shops may be owned by a company, a partnership, or an individual, and they may or may not be managed by the owner. A department store can be regarded as an aggregation of shops in one building and under one control, the characteristic being that there exist separate department accounts for each section. The small independent retail shops are far more numerous than any other type; their number in Great Britain is frequently given as about 650,000.

Multiple and Chain Stores

Such classifications as to size must be distinguished from those relating to the commercial and financial organizations of retail outlets. Multiple and chain stores represent a new and progressive development. The definition of the multiple shop already officially in use is that it belongs to a trading concern having ten or more branches. The retail unit is here multiplied in a number of different shopping areas, either locally or nationally, and the resulting multiple organization is controlled by one central management. It is not the size of the single shop which is the characteristic, but the commercial and financial organization by which it tries to concentrate

the buying of merchandise in bulk and spread it over a large number of retail outlets of the same type; thus are secured the economic advantages of buying in large quantities, concentrating on certain goods which most people have been found to want, and through this reducing overheads. This type of organization finds expression along three distinct lines:

(1) *The ordinary multiple shop company* distributes merchandise covered by a single trade, e.g., groceries, tobacco, stationery.

(2) *The cooperative societies* are built up on the principle of eliminating intermediary trading stages between the manufacturer and the consumer by organizing consumers into associative bulk-buying bodies, dividing the surpluses accruing in the form of "dividends" to members.

(3) *The "fixed price" chain stores*, like the cooperative stores, resemble the structure of the departmental store or bazaar in their variety of merchandise, but selling prices are restricted to cheap and mass-produced commodities which can be easily ranged into a few price categories. Started in the U.S.A., they spread later to the U.K. and other countries of Europe. The changes in conditions of production during and after the Second Great War put an end, temporarily at least, to the "fixed prices" charged by such stores.

An important aspect of retailing is club or check trading. This tries to assist consumers by credit-giving facilities, as also does hire-purchase selling. The former type of trading assumes two forms: there are clubs (mostly in the clothing trade) into which a member pays a weekly deposit, receiving interest, and using both principal and interest at the end of an agreed period to make purchases at some specified shops; and clubs in which the member may receive the goods he wants to buy before he has actually completed payment for them. Club trading has been much criticised for the increase in the distributive cost involved by the employment of large staffs of canvassers and agents.

Modern development of retailing has shown a tendency to combine manufacturing, wholesaling, and retailing within one business. But it seems that this system is applicable only where commodities can be standardised and sold in large quantities. Yet there can be no doubt that the position of the small, independent retailer is in many ways threatened through the

development of chain, cooperative, and department stores. He has still the best chances where proximity to customers gives him an advantage, where he can offer personal service and delivery to nearby customers, and where as an artisan-retailer he can offer skill in service and repair work.

Retail trade associations are on the one hand intended to further the interest of members by advice, information, statistical research, and official representation in important trade matters; on the other hand, they mostly pursue a policy directly concerned with practical and specific trade issues, such as prices and the fixing of distributive margins, the regulation of competition, price maintenance, regulation of entry to a trade. In those respects they aim at a restriction of retail competition; and they sometimes support proposals for the registration and licensing of shops.

Hermann Levy

Bibliography. Practical Aspects of Retailing, J. L. Courtney, 1939; Retail Trade Associations, H. Levy, 2nd ed. 1944; A Nation of Shopkeepers, T. S. Rothwell, 1947; The Shops of Britain, H. Levy, 1948; Retail Distribution, H. Smith, 2nd ed. 1948.

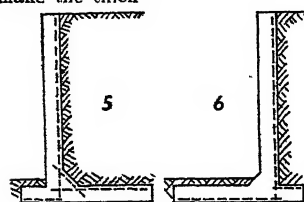
Retainer. Fee of a nominal amount paid to a barrister in order to retain his services either generally, or for a particular case. A barrister so retained has a right to be briefed at a fee proportioned to his rank and standing at the bar, and once he has accepted a retainer he cannot accept a brief for the other side, no matter how tempting a fee they may offer him. A brief fee, which is of substantial amount, is frequently, though wrongly, described as a retainer. See Barrister; Brief.

Retaining Wall. Wall of brickwork, masonry, mass concrete, or reinforced concrete, built to retain earth at the back where there is a drop in level in the land, as in a cutting, terrace, or embankment. In civil engineering large examples may be found in rly. and dock construction. The larger types in building construction are used to retain earth around deep basements and sunken approach drives; the smaller to retain earth in terraces, shallow basements, and around boundaries where the ground or garden is a few feet higher than the road outside.

These walls may be of solid brickwork or other material in which stability depends upon mass or weight, or of reinforced concrete so designed that the steel rein-

forcement takes the tensile and shear stresses and the monolithic construction of wall and foundation prevents overturning. For small retaining walls mass construction is usually adopted, as in Figs. 1, 2, 3, and 4; but for high ones reinforced concrete is cheaper, and two examples are shown in Figs. 5 and 6.

A simple rule for designing mass brickwork and masonry retaining walls is to make the thick-



Retaining Wall. Examples of various types. See text

ness at the base one-third of the height from the top of the foundation to the top of the wall. For a high wall this may be progressively reduced by half at the top of the wall, provided the retained earth is compact and the foundation adequate. Alternatively, the face may be battered (sloped) back, the base thickness being one-third the height and the top thickness one-fifth the height. If the retained earth is rather loose, projecting piers should be built on the wall at intervals of about 12 ft.

Reinforced concrete retaining walls require less bulk of material than mass walls, but greater skill in design and construction. As they tend to bend outwards, the steel reinforcement is placed near the back to take the tensile (pulling) stress. The toe foundation may project inward, as in Fig. 5, where the weight of the retained earth holds it down; or outward, as in Fig. 6, where it bears on the ground.

Retaining walls must have open weep holes at intervals near the base, so that water from the earth can be drained away and no liquid pressure is exerted at the back of the wall. See Building.

Retention. Scots legal term for the right of a creditor to retain the property of a debtor until the latter has paid his debt to him. The right is limited to the special purposes and conditions of the deposit.

Retford, EAST. Mun. borough and market town of Notts, England. It stands on the river Idle, a canal, and the Great North Road, 138 m. N.N.W. of London, and is a rly. junction. The principal church is S. Swithin's,

which was rebuilt in the 17th century, and the chief secular buildings are the town hall, corn exchange, and grammar school, founded in 1552. The industries include corn mills, iron foundries, engineering, rubber, and dye works, and paper mills. A large agricultural trade centres in a covered market. In the Middle Ages East Retford became a borough, and held fairs and markets. It was separately represented in parliament from 1315 to 1885. In 1830 the hundred of Bassetlaw was made part of the constituency, and now gives its name to the whole. West Retford is part of the borough. Market day, Sat. 15, 900.

Rethel. Town of France. In the dept of Ardennes, it stands on the Aisne and the Canal des Ardennes, 23 m. N.E. of Reims. The chief buildings are the church of S. Nicholas and the Hôtel Dieu. A Roman settlement, Rethel was an important place in the Middle Ages, when a priory was founded. It was the capital of a county, at one time part of Burgundy; this was made a duchy in 1581. Here Turenne, fighting for the Fronde, lost a battle, Dec. 15, 1650, but on the royalist side he captured the place in 1653. It figured in the First Great War battles of the Aisne.

Reticulum (Lat., little net). In astronomy, a southern circum-polar constellation, one of the four which border on the Greater Magellanic Cloud between Hydrus and Dorado. It was so named by Lacaille. See Constellation.

Retimo or **RETHYMNON**. Port and town of Crete, the ancient Rhethymnos. On the N. coast, about 49 m. W. of Candia, it has a shipping trade in olive oil and valonia. Pop. 8,632. Retimo gives its name to a dept. with pop. 76,141. See Crete.

Retina. Membrane composed of ten layers of tissue. It forms the

innermost covering of the interior of the eyeball, extending forwards to within a short distance of the margin of the pupil. It is formed by an expansion of the optic nerve. The retina is the structure upon which fall images formed by rays of light passing through the lens, and it transmits through its complex layers the stimulus caused by the image, thus giving rise to the sensation of vision.

Inflammation of the retina (retinitis) accompanies kidney disease, syphilis, etc. Detachment of the retina, due to a blow, or to physical strain in very short-sighted persons, causes complete or partial blindness. See Eye.

Retort (Lat. *retortus*, bent back, twisted). Generally, an apparatus in which a mixture or compound is broken up by the aid of heat or chemical action. One or more of the constituents of the contents of the retort is volatilised and expelled from the apparatus into another appliance where it may be condensed or absorbed and so collected. There are three broad classes: first, the appliance of the chemical laboratory, usually of glass, but sometimes of earthenware, clay, or metal; second, the fireclay or iron chamber of the ordinary gas works in which coal is destructively distilled, and from which the crude gas issues to the hydraulic main; and third, the vessels of various shapes and materials used by the metallurgist for extracting metals from their ores and for separating the metals of amalgams. The term is also sometimes applied to the containers or muffles in which iron is converted into steel by contact with carbon. A still is a retort. See Charcoal; Distillation; Mercury; Zinc.

Retreat (Lat. *retrahere*, to draw back). Military term to describe a retirement before the enemy. When carried out for strategic reasons, so as to secure a better position for fighting, a retreat is more correctly a withdrawal and implies order and cohesion. A notable strategic withdrawal of the Second Great War was that of the British Army to Egypt in 1941, while the British retreat through Burma into India in 1942 began as a retreat but developed into a strategic withdrawal. A retreat is strictly a deliberate attempt to break off engagement and fall back without any effort being made to form a fixed line of resistance. Notable retreats are those of the Ten Thousand described by Xenophon, Sir John Moore's retreat on Corunna in 1808, Napoleon's retreat from

Moscow in 1812 and the retreat from Mons in 1914. In the Second Great War, there were the retreat on Dunkirk, Rommell's rout in N. Africa in 1943, and the German armies' retreat into Germany in 1945. Retreat is also the name of a military bugle call to assemble pickets and put the guard on a night footing. A ceremonial retreat is played in the evening by the fife and drum band marching and counter-marching on the square.

Retreat. Place of retirement for religious exercises and meditation. The word is applied to a monastery, convent, or hermitage, e.g. S. Joseph's retreat, Highgate, London, mother house in England of the Passionists (*q.v.*), and Jordans, Bucks, the retreat of the Society of Friends.

Retriever. Sporting dog of the spaniel group, produced by a cross between the lesser black Newfoundland



Retriever. Flat-coated retriever, a British sporting dog

land and the water spaniel. Often a strain of setter blood has been introduced. It is used for retrieving game on land as the water spaniel does in water. There are four types of retriever recognized by sportsmen. The Labrador is as a rule merely a small black breed of Newfoundland; the flat or wavy-coated is the result of a cross between the Labrador and setter; the curly-coated is considered by most authorities to be a cross between the Labrador and water spaniel, and is equally good in water or on land; the golden retriever is derived from the flat-coated retriever, but is of a rich golden colour. The first three varieties are usually black or liver-coloured. A retriever should have what is known as a tender mouth, and should hold the game without mangling it. Some of these dogs will carry a bird so gently as not even to displace its feathers. See Dog colour plate.

Retrograde Motion (Lat. *retro*, back; *gradī*, to walk). In astronomy, the motion of a planet or the satellite of a planet when it is in the direction opposite to the general

direction of motion. The moons of Uranus and that of Neptune, the ninth satellite of Saturn, and three outer satellites of Jupiter revolve about their planets in a direction contrary to that of all other members of the solar system. The term is also applied to the backward movements of planets in the skies as seen from the earth. Many comets also have a retrograde motion.

Retrogression. In music, a contrapuntal device by which the theme or subject is repeated by being played backwards. It is also known as retrograde imitation. See Counterpoint.

Returning Officer. Official who conducts an election. In parliamentary elections the duties are performed by the sheriff in counties, and in boroughs by the mayor. Certain expenses incurred are allowed by statute. On the issue of the writ the returning officer receives nominations for the vacant seat, and also the cautionary deposit of £150 from each candidate. It is also his duty, sometimes by deputy, to see that the election is held in the manner prescribed by law. He announces the result and reports it in proper form to the Speaker. See Election.

Return of the Native, THE. Thomas Hardy's sixth novel, regarded by some critics as his finest. In this tragedy, published 1878, are presented people who have remained in their rustic outlook and others who have been educated into something different. In the emotional instability which follows their meeting, they marry unsuitable partners. The characters are all vividly drawn; but the chief character—also the one first introduced—is Egdon Heath in all its seasons.

Retz, RAIS, OR RAIZ, GILLES DE (c. 1396–1440). French soldier and criminal. Born of the Laval family, he served in the wars and was made marshal of France. Later he was tried on a charge of disobedience to the authority of John VI of Brittany, and the discovery was made that he had engaged in an almost incredible series of murders and debauches. Human remains were found at Vannes, Chantocé, Machecoul, Nantes, Rais, Tiffange, etc., and it was estimated that some 150 children

and numerous women had met death at his hands. He was hanged and burnt at Nantes, Oct. 25, 1440. Perrault's story of Bluebeard may be founded on his career.

Retz, JEAN FRANÇOIS PAUL DE GONDI, CARDINAL DE (1613–79). French ecclesiastic and writer.

He was born at Montmirail, Sept. 20, 1613, and was educated for the Church, and was made coadjutor to his uncle the archbishop of Paris, 1643, succeeding him in 1654. He was a prominent enemy of Mazarin before and during the Fronde (*q.v.*), but became a cardinal despite Mazarin's opposition. Imprisoned in 1652, he escaped in 1654, and lived abroad until the death of Mazarin, becoming abbot of St. Denis, 1662. He retired to St. Mihiel, and died in Paris, Aug. 24, 1679. De Retz had always won the people's favour by his charitable gifts, and his last years were devoted to philanthropy and religion. He had his periods of social brilliance and dissoluteness, and has enshrined in his vivid Memoirs (pub. 1717, Eng. trans. 1904) the period 1643–55, the account being marred by bias. His works were edited 1870–96. *Pron.* Race.

Reuchlin, JOHANN (1455–1522). German scholar. Born at Pforzheim, Feb. 22, 1455, a cousin of Melancthon, he visited most of the seats of learning in Europe, studied Greek, Latin, and Hebrew, and taught jurisprudence and literature. He was private secretary to the court of Lorenzo de' Medici at Florence, a judge of the Swabian League, and held professorships at Wittenberg, Ingolstadt, and Tübingen. His Rudimenta Linguae Hebraicae, 1506, gave a remarkable impetus to the study of the Hebrew text of the Bible. When the destruction of Jewish books except the O.T. was proposed, he aroused controversy by maintaining that only those of pronounced anti-Christian character should be condemned. He published a Greek grammar and a Latin lexicon, edited Greek texts, and wrote De Verbo Mirifico, 1494; and De Arte Cabbalistica, 1517. He died at Liebenzell, Bavaria, June 30, 1522. See Renaissance. *Pron.* Roikhlin.

Reunion. Term applied to the policy of uniting different Christian Churches. The multiplicity of



Cardinal de Retz, French writer



Gilles de Retz, French soldier

Churches began after the Reformation by a kind of cellular process in which new Churches split off from older bodies. In the 16th century the Baptists, in the 17th the Congregationalists; and in the 18th the Methodists broke away from the Church of England. In 1843 the Free Church of Scotland separated from the Established Church of Scotland. During the 19th century the tendency was reversed, the prospective reunion of the separated Churches coming under discussion; but it was not until the 20th century that effective steps were taken. In 1900 the Free Church and the United Presbyterian Churches combined to form the United Free Church of Scotland. The process was quickened by the First Great War, when the non-Roman Churches began to draw together. Anglicans and Orthodox (Eastern) bishops met at the Lambeth Conference of 1920 and an appeal for religious unity was issued. The first great international Church conference took place at Stockholm (1925), promoted by Archbishop Söderblom of Sweden and Bishop Brent of the U.S.A. This was followed by other conferences at Lausanne (1927), Oxford, and Edinburgh (1937). In 1948 the first world council of Churches was constituted at Amsterdam. In the meantime practical steps for effective reunion had been taken; in China the Presbyterians and Congregationalists became the United Church of Christ (1921); in Africa the Church of Scotland, the United Free Church of Scotland, and the Dutch Reformed Church united to form the Church of Central Africa (1924); in Canada the Methodists, Presbyterian, and Congregational Churches became the United Church (1925); the reunion of the Established Church and the United Free Church of Scotland in 1929 healed the schism of 1843; in England the Wesleyan, Primitive, and United Methodists united to form one Church (1932); in S. India the Presbyterians and Congregationalists, who had united in 1908, joined the Wesleyans and Anglicans to form the South India United Church (1947). In the U.S.A. after discussions lasting for over 50 years, the Methodists united in 1940 to form the largest Protestant community in the country (8,000,000), and the United Brethren and Episcopal Church united in 1946. Discussions have taken place there between the Protestant Episcopal Church and the Presbyterians; in Canada similar discus-

sions have gone on between the Church of England and the United Church of Canada; and in Australia the Church of England has negotiated with the Congregationalists, Methodists, and Presbyterians. *Consult* The Church of England and the Free Churches, G. K. A. Bell and W. L. Robertson, 1925; Union of Christendom, B. K. MacKenzie, 1938; Christian Reunion, Hugh Martin (1941); Towards the United Church 1913-1947, W. J. Noble and others, 1947; Christian Unity, G. K. A. Bell, 1948.

Réunion, ÎLE DE LA. Island of the Indian Ocean, ranking, since 1947, as a department of France. It lies about 420 m. E. of Madagascar, and, measuring some 45 m. in length and 32 m. broad, has a total area of 970 sq. m. The surface is mountainous, and the island, of volcanic origin, is crowned by the extinct volcano, the Piton des Neiges, 10,070 ft. It is well watered, and has a fairly healthy climate. Sugar planting is the chief agricultural activity, other products including coffee, tea, tobacco, rubber, vanilla, cloves, manioc, rice, tapioca, and maize. Rum is manufactured in large quantities. A rly., built 1887, serves the chief centres.

The capital is St. Denis (pop. 32,637), other towns being St. Paul (23,055), St. Louis (20,867), and St. Pierre, (20,150). The island is administered by a governor, assisted by a privy council and an elected council-general. In Paris Réunion is represented by one senator and three deputies. Its mixed pop. totals 220,955, which includes 214,382 French.

Discovered by the Portuguese Pedro de Mascarenhas, 1513, it was taken over by a French explorer in 1638, and was known as Bourbon from 1649. From 1810 to 1815 it was in English hands, and was renamed Réunion when restored to France.

Reus. City of Spain, in the prov. of Tarragona. It is 10 m. by rly. W. of Tarragona, and 4 m. N. of Salou, its port on the Mediterranean. It is the most important commercial and industrial town in the province. It has an art academy, and handsome public buildings. The prosperity of the town dates from 1750, when an English colony here founded a trade in cottons, leather, wine, etc. It manufactures also hats, silk, soap, and linen, and exports flour, fruit, and brandy. Pop. 36,500.

Reuss. River of central Switzerland, a tributary of the Aar. It rises on the N. slope of Mt. St. Gotthard, in canton Uri, and, flow-

ing past Andermatt and Amsteg, enters the lake of Lucerne near Flüelen. Leaving it by the town of Lucerne, it flows through Aargau to unite with the Aar near Windisch after a course of about 90 m. See Aar; Rhine.

Reuss. Name of two former German principalities in Thuringia. In the Middle Ages this tract of land in central Germany came under the rule of a line of counts who were vassals of the emperor. One of them was known as der Russe (the Russian), and this became the name of his country. The two sections, each ruled by a prince, became known as Reuss-Greiz and Reuss-Schleiz-Gera. In 1918 their combined area was 441 sq. m., and their pop. 221,500. The reigning family had the curious custom of naming each male member Henry, the latest heir to the throne being a well-known theatrical director, and ranking as Henry XLV. In 1920 the states of Reuss united with the other Thuringian states in the free state of Thuringia (*q.v.*).

Reuter, GABRIELE (1859-1941). German novelist. Born Feb. 8, 1859, at Alexandria, Egypt, where her father was in business, she returned to Germany on his death, 1872, and eventually settled in Berlin. She had been writing fairly successful novels, 1876-94, when she produced a remarkable study of the feminine mind in *Aus guter Familie*, 1895. This achieved considerable success and was followed by *Liselotte von Reckling* (1904), *Benedikta* (1923), *Irmgard und ihr Brüder* (1930), and others. She died at Weimar in 1941. *Prom. Roiter.*

Reuter, LUDWIG VON (1869-1943). German sailor. Born Feb. 9, 1869, he entered the navy in 1885, commanding a cruiser squadron early in the First Great War. Rear-admiral at the time of the armistice, 1918, he was appointed commander of the fleet to be surrendered to the Allies. On Nov. 21, flying his flag in the battleship *Friedrich der Grosse*, he delivered up the German fleet to Beatty and took it to Scapa Flow. There on June 21, 1919, Reuter ordered the ships to be scuttled, his defence being that he believed the armistice had terminated. He published *Scapa Flow* in 1928. His death was announced Dec. 22, 1943.

Reuters. British news agency. It was founded by Julius Reuter (1816-1899), a bank clerk in Cassel who in 1849 began a pigeon post service to carry the closing prices of the Paris Bourse

between Brussels and Aix-la-Chapelle. This was so successful that he soon began handling general news. Shortly after the opening of the Calais-Dover cable in 1851 Reuter came to England and made London his headquarters. Within a few years Reuters developed into a universal network for the collection and transmission of news, having correspondents in all the principal towns and cities of the world.

Reuters reputation for accuracy and strict impartiality led to acceptance of the service by most newspapers. Julius Reuter, who became a naturalised British subject in 1853, conducted his agency as a family business until 1865, when he sold it to Reuters Telegram Company, of which he became managing director. As a joint stock company, Reuters shares could be freely bought and sold, and there was nothing to



Baron Reuter,
founder of the news
agency

prevent the agency coming under foreign control. Soon after the outbreak of the First Great War, a small private trust was established which purchased Reuters shares for £500,000 and ensured its British ownership. In 1947, a fresh trust was formed, and Reuters is now jointly owned and controlled by the Press Association, Newspaper Proprietors' Association, the New Zealand Press Association, and the Australian Associated Press. The trust deed provides that Reuters shall never pass into the hands of one interest or group, and that its integrity, independence, and freedom from bias shall be maintained. The head office of the agency is at 85, Fleet Street, London, E.C.4. Reuters was the subject of a film, *This Man Reuter*, with E. G. Robinson in the title rôle (1941).

Reutlingen. Town of Württemberg, Germany, at the entry of the river Echaz into the fertile Neckar plains, 20 m. S. of Stuttgart. Known since 1090, and a free city since 1240, it still contains, although wellnigh destroyed by fire in 1726, one of the country's most precious Late Gothic buildings, the church of S. Mary, built in the 13th and completed in the 14th century, with a tower 240 ft. high. Reutlingen has been the centre of several flourishing industries, in-

cluding leather, textiles, and engineering. It was a spa and possessed a technical college. A remarkable workers' settlement was built 1904-18. In 1945 Reutlingen came within the French occupation zone. Pop. 62,500.

Reval. Former name for Tallinn (*q.v.*), capital of Estonia S.S.R. **Reveille** (*Fr. réveiller*, to awake). Signal by beat of drum, or, more commonly, by bugle call, to rouse



Reveille. Notes as written for bugle, sounded to arouse troops in the morning

troops in the morning; also as a signal that sentries need no longer challenge. There are two notations for reveille, long and short; the latter is most commonly used in camps, while the former, seldom used, is reserved for ceremonial occasions. In certain Scottish regiments, but not the kilted ones, reveille is called on the bugle, followed by a longer, Scottish reveille on the bagpipes.

Revel. Term for a noisy, riotous feast or merry-making. It was applied to the English and Scottish foolery carried on under a lord of misrule or abbot of unreason (*q.v.*). At an early date entertainments at court were known as revels, and the official whose duty it was to arrange and control these entertainments was known as the master of the revels. The office is at least as old as the time of Edward III; by the time of Henry VIII it was of some importance, and in Elizabeth's reign the master of the revels, *magister jocorum, revelorum, et maseorum*, was made also dramatic censor. Sir Edmund Tilney held the office, 1579-1610, and his successor, Sir George Buc, wrote a treatise on the Art of Revels which has been lost. By 1737 the office seems to have died; the theatrical jurisdiction attached to it was, at all events, transferred to a legally appointed stage censor.

Revelation (*Lat., revelare*, unveil). Term describing the self-manifestation of God to man or the disclosure by God of Divine truth to man. In every form of religion there are two sides: (1) the quest of man for God; (2) the imparting by God of truth to man. The second aspect is known as revelation. Belief in it assumes the possibility that God can communicate knowledge of Himself to man. This communication is made in many forms. It may come through nature. As the Psalmist says: "The heavens declare the glory of God, and the firmament

showeth His handiwork." It may come through the enlightenment of the mind and the awakening of conscience. The Hebrew prophets felt that God had put His word into their mouths.

The older theories of inspiration maintained that the truths of revelation were verbally dictated to the prophets. That view is now completely abandoned (*see Prophecy*). "Spiritual things are

spiritually discerned." There must be a certain quality of mind and soul in the recipient before the Divine manifestation can be imparted, and the character of the revelation is always coloured and modified by the character of the personality to whom it is given. Hence there was a development in the process of revelation, because there was a growth in the capacity of men to receive the Divine truth. The O.T., therefore, is the record of the development of revelation, which continually works up towards its climax in Christianity. Christianity claims to be the perfect, complete, and final revelation of God. *See Bible; Inspiration.*

Revelation, THE. Last book of the N.T. The title is derived from the Greek word *apokalypsis* (unveiling, or revelation), and hence the book is often called the Apocalypse. It belongs to a special type of literature known as apocalyptic, and stands in the same class as the Book of Daniel and the many Jewish apocalypses which appeared in the intermediate period between the O.T. and N.T. Tradition ascribes the authorship of the book to John the Apostle, but ever since the time of Dionysius of Alexandria this has been questioned, and most modern scholars are agreed that it could not have been written by him.

The interpretation of the Apocalypse has always been a difficulty; while its strange and fantastic imagery has always appealed to the Christian mind, there has been the utmost diversity of opinion as to its meaning. Some theologians, known as Futurists, have held that its predictions are entirely concerned with the events connected with the end of the world. Others hold that it contains a prophetic forecast of the history of the world, from its own day to the end of time.

Both views are improbable, as they are in conflict with the writer's

own statement that he was speaking about things which were "shortly to come to pass," and moreover they are out of keeping with the genius of ancient prophecy. It is a mistake to suppose that the Book of The Revelation contains a cryptogram, by solving which it is possible for us to ascertain the date of the end of the age. The more likely interpretation is what is known as the Preterist, which holds that throughout the book the writer is speaking of the events (either actual or predicted) of his own day. The Church was face to face with a serious persecution which threatened its extinction. The conflict between Christianity and Caesar-worship was at its height. The Book of The Revelation was written to comfort and encourage the suffering Christians in the age of Domitian. It held out to them the promise, which was the main article in the Apocalyptic faith, of the intervention of God, Who would destroy their enemies and secure their own salvation. See Apocalypse; Bible; John, S. Consult The Book of Revelation, W. M. Milligan, 1919; E. E. Scott, 4th ed., 1945; The Lord Reigneth, A. W. Burnett, 1946.

Revelstoke. Town of British Columbia, Canada. On the Columbia river, 245 m. N.E. of Vancouver, it is a rly., mining, and timber centre, also a tourist centre for the Rocky Mts., with all-year-round ski-ing. Pop. 2,106.

Revenge. English warship. Of 500 tons and carrying 250 men, she bore Drake's flag against the Spanish Armada in 1588. She is more famous, however, for the circumstances of her destruction by Spaniards on Aug. 31, 1591, when her commander, Sir Richard Grenville, against orders attempted to pass through an enemy squadron. Engaging some fifteen warships, he fought for 15 hours until only a score of men were left alive. Tennyson's ballad has immortalised the episode by dwelling on Grenville's valour and overlooking his disobedience.

Reventlow. Name of a Danish family. Count Christian Reventlow (1748-1827), statesman and reformer, was born March 11, 1748. He held important administrative posts, and in 1786 induced the crown prince Frederick to appoint an agricultural commission which abolished villeinage. He died Oct. 11, 1827.

Count Ernst Christian Einar Ludwig Detlev Reventlow (1869-1943) was born Aug. 18, 1869, at

Husum, Slesvig-Holstein, then part of Prussia. After serving in the navy he wrote much on strategic and political subjects, and was an ardent pan-German politician before the First Great War. Elected to the Reichstag, 1924, he joined the Nazi party in 1927. He died at Munich, Nov. 21, 1943.

Count Eduard Reventlow (b. 1883), Danish diplomatist, was born Nov. 28, 1883, and educated at Copenhagen university. In the diplomatic service he held important posts in Copenhagen, Berlin, and Paris, 1909-13. He was minister in Stockholm, 1932-37, and in London from 1938, but was dismissed by the Copenhagen government in 1942 because he had become hon. president of the Free Danish movement in Great Britain. That position he occupied until 1945; he was then reinstated as minister, and in 1947 his status was raised to that of ambassador.

Revenue (Lat. *revenue*, to come back). Receipts or rents of any kind. The word is chiefly used, however, for the revenue of a state, as are the phrases national revenue and inland revenue. A revenue officer is an officer of the customs and excise; a revenue cutter, an armed vessel formerly used to prevent smuggling. See Customs; Income Tax; National Finance; Preventive Service.

Reverberatory Furnace. Type of furnace widely used in extraction metallurgy. The name derives from its principle. If solid fuel is used it is burned in a separate chamber; if liquid, gaseous, or powdered fuel is used it is burned at one end through special ports. Whatever the fuel, the products of combustion are led over a hearth so that they impinge on the roof of the furnace, which "reverberates" the heat down on to the charge. Small furnaces of this type have been used for many years in lead smelting, and since the beginning of the 20th century the application of the reverberatory furnace to copper smelting has advanced enormously.

Furnaces may be more than 100 ft. long and 20 ft. broad, and are worked continuously, the concentrate being added at suitable points through hoppers leading through the roof. A constant bath of molten matte is kept in the furnace and tapped off when needed, the slag being allowed to flow off. The limiting factor in size is the roof arch, as refractory materials could not be found to stand the high temperatures with

the enormous strain of a wide arch. The difficulty has been overcome by the use of a suspended roof of magnesite brick. Being supplied with external support at frequent intervals, the roof can be made much wider without danger. The open-hearth furnaces used for steel-making are similar in principle, and reverberatory furnaces will also roast ores and refine crude metal. See Furnace.

Revere, PAUL (1735-1818). American soldier. He was born in Boston, Mass., and at about 20

was an officer in the artillery. Later he was successively a goldsmith and a copper plate engraver. He took part in the destruction of tea in Boston Harbour, Dec. 16, 1773, and on April 18-19, 1775, rode out by night from Charleston to Lexington and other places, arousing the minute men to oppose the advance of the British troops on Concord. This exploit is the theme of Longfellow's poem, Paul Revere's Ride. He later founded the Revere Copper Co. at Canton, Mass., in 1801, and died May 10, 1818. Consult True Story of Paul Revere, C. F. Gettemy, 1905; P. R.'s Own Story, H. O'Brien, 1929.

Reverend (Lat. *reverendus*, worthy of respect). Courtesy title bestowed on all ministers of all denominations. In the Church of England archbishops are styled Most Reverend, bishops Right Reverend, and deans Very Reverend. Priests and deacons and Nonconformist ministers are styled Reverend throughout the British Empire and in the U.S.A. In Scotland, the moderator of the General Assembly is styled Right Reverend, and the principals of the universities, if in orders, Very Reverend. In R.C. countries priests are styled Reverend Father, and abbesses and prioresses Reverend Mother. It should be noted that in speaking or writing, the prefix Reverend is not a substitute for Mr., i.e. "The Rev. Smith" is incorrect; the form should be either the Rev. Mr. Smith, the Rev. J. Smith, or plain Mr. Smith. See Clergy.

Reversing Layer. In astronomy, a layer or stratum in the sun's atmosphere, immediately overlying and at a rather lower temperature than the actual solar



Paul Revere,
American soldier

surface. The spectrum of the sun is ordinarily crossed by a very large number of dark lines. According to theory they are produced by the absorptive effect of incandescent gaseous substances in the sun's atmosphere. These gaseous materials are themselves glowing, but the lines they produce are relatively dark against the more brightly glowing background of the sun.

On the occasion of an eclipse the sun's brightness is out off; and, as was first seen at the eclipse of 1870, the spectrum hitherto crossed by dark lines becomes suddenly covered with bright ones, as if the dark lines had become reversed. This flash spectrum (*q.v.*) was attributed by Young to the presence of the reversing layer, which is not nowadays, however, distinguished from the base of the chromosphere (*q.v.*). See Fraunhofer Lines; Photosphere; Spectroscopy; Sun.

Reversion (Lat. *revertere*, to turn back). Term used in English law. It denotes the estate which remains in a grantor after the determination of a particular estate granted by him. Thus A, the owner in fee simple of a house, grants a lease to B for 99 years. A is said to have the reversion expectant on the determination of the lease. If B in his turn grants a sub-lease to C for 21 years, B again has the reversion expectant on the determination of the sub-lease. A's reversion is called a freehold reversion, and B's a leasehold reversion. It is quite competent for A to grant another lease, to come into force after the expiration of B's lease, and such a lease is called a reversionary lease.

Reversion to type is a biological term expressing the reappearance of an ancestral characteristic. It may happen in two ways. The individual may revert towards an ancestor through the loss of some power of development in the germ-cell from which he sprang. Secondly, he may reproduce an ancestral characteristic which has been missing in recent generations. Reversions to type occur occasionally when domestic varieties of animals are crossed experimentally, but they also arise in pure-bred individuals. Thus, in purely bred races of pigeons of every kind known in Europe, blue birds occasionally appear, which is a reversion. See Atavism; Biology; Heredity.

Review of Reviews, THE. A former British monthly periodical. It was founded in 1890 by

W. T. Stead (*q.v.*), to provide a synopsis of the best articles in the reviews and magazines of the month, together with a survey of current events. Its success led to the foundation of an American edition in 1891 and an Australian edition in 1892. After Stead's death it passed through several changes until in 1923 H. Wickham Steed became proprietor and editor, remaining until 1930. When Edward Hulton took over control in 1940, the periodical was renamed *World Review*.

Revising Barrister. Person formerly appointed under the Registration of Electors Act to investigate claims and objections to the admission of names on the register of persons entitled to a parliamentary vote. See Barrister; Election; Registration.

Revival (Lat. *re*, again; *vivere*, to live). Term used for a recovery of any kind, *e.g.* of culture or trade. In a religious sense it refers to any movement for promoting and awakening religious zeal and enthusiasm. Examples are the Franciscan revival in the 13th century, and the Wesleyan in the 18th. In its more modern sense the term is used for movements among the evangelical denominations—especially in the Free Churches—in which great outbreaks of fervour have accompanied the meeting conducted by popular preachers. Among these may be mentioned the work of Moody and Sankey in 1874, and the Welsh revival under Evan Roberts in 1905. "Billy" Sunday, a baseball player ordained in the Presbyterian Ministry in 1905, was a celebrated revivalist preacher. See Methodism; Moody, D. L.; Sunday, W.; Wesley, J.

Revival of Learning. European movement from the 14th to the 16th century consisting of a renewed interest in and knowledge of the Greek and Latin languages, literature, and antiquities. An important phase of the Renaissance, it began about 1350 with Petrarch and others. Learned Greeks taught in Italy, Greek and Latin classics were rediscovered, and monastic education was replaced by that based on Humanism. The dissemination of Greek scholars through Europe after the fall of Constantinople to the Turks in 1453 accelerated the process. The invention of printing powerfully aided the movement, which had spent its force in Italy by 1520 and spread northward. See Bembo, P.; Education; Erasmus, D.; Humanism; Library; Miran-

dola, P. della; Petrarch, F.; Poliziano, A.; Printing; Renaissance; Reuchlin, J.

Revocation (Lat., calling back). In English law, taking back, annulment, or cancellation of a thing done or granted. A contract may be revoked by mutual consent before anything is done under it. A will may always be revoked; and it is frequently advisable, on making a fresh will, to say, "I revoke all former wills by me made." The authority of an agent is revoked by the death or bankruptcy of his principal. The word is also used for the annulling of any law, *e.g.* the revocation of the edict of Nantes in 1685.

Revolt of Islam, THE. Poem in twelve cantos by Shelley. Originally printed in 1817 as *Laon and Cythna*, or the Revolution of the Golden City: A Vision of the Nineteenth Century, it was suppressed and published in the following year under its present title. Written in Spenserian stanzas, it has many beautiful passages, but lacks any sufficient plot to hold the interest through nearly 5,000 lines. It is a story of revolution produced by the individual genius of the hero and heroine, the Golden City being Constantinople.

Revolution (Lat. *re*, again; *volvere*, to turn). Term used for the motion of any body round a centre or axis, for instance the revolution of the moon round the earth. In political science the word refers to any violent political change, such as the forcible overthrow of a regular form of government. It is thus opposed to reform, which implies a gradual change carried out by constitutional methods. In England the substitution in 1688 of William III for James II, although bloodless, is known as the Great Revolution. Other examples are the French Revolution of 1789, the American of 1776, and the overthrow of the tsarist regime in Russia, 1917. "The year of revolutions" was 1848, when there were movements all over Europe demanding constitutional government in place of despotism. The change that turned Great Britain from an agricultural into a manufacturing country is known as the Industrial Revolution (*q.v.*). See England; History; French Revolution.

Revolver. Pistol with a revolving cylinder, comprising a group of cartridge chambers, capable of firing a number of shots without reloading. The principle of revolving barrels is of consider-

able antiquity, and a few specimens of flint-lock revolvers are known. The complication was, however, too great for firearms of that nature to have much vogue, and the advent of the percussion cap was necessary for the revolver to become a success.

The "pepper-box," one of the earliest varieties, is fairly well



known. It had four or six barrels, generally all bored in the same block of metal, which rotated round a central axis as the hammer was worked. The development of the revolver is chiefly due to the efforts of Colonel Colt, who devoted much time to the subject from 1835. By that date he had produced an efficient weapon having one barrel and a revolving cylinder with six chambers. The latter were muzzle-loading and the hammer had to be cocked by hand for each shot, i.e. the revolver was of the type known as "single action." It was extremely reliable and accurate.

Breech-loading revolvers began to appear about 1850. By 1870 most revolvers were breech-loading, and central fire ammunition had been introduced. It had displaced all other varieties for the larger calibres, although pin-fire ammunition is still used in cheap Belgian revolvers, whilst rim-fire is paramount for .22 calibre. Up to 1890 most revolvers were of the solid frame type, the empty cartridge cases being ejected one at a time through a slot in the end plate by means of a sliding pin, and all were single-acting.

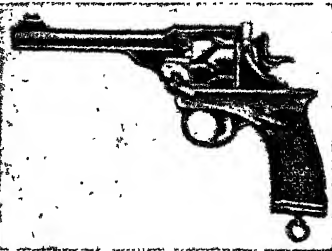
The self-ejecting type was invented by Smith and Wesson, the barrel and cylinder together pivoting on the frame, the action of "breaking" the revolver causing a flange on the end of the cylinder to rise and throw out all empty cases. Double-action revolvers, i.e. those in which a long pull on the trigger cocks the hammer and then lets it fall to fire the shot, also became general about the same time. In ejecting mechanism of this type it is essential that the catch holding the barrel to the top of the frame be of sound construction, and many experts hold the view that this type is unsafe for a weapon of

greater calibre than .32. The Colt system overcomes this objection by the use of a solid frame, i.e. the barrel and the frame are constructed from one piece of metal, the cylinder being carried in a small sub-frame, mounted on an axis at its lower edge so that the cylinder may be swung out sideways, and all the empty cases ejected by



century. In its earlier form, in Paris, produced generally in Dec., it was a review, satirical and frivolous, intermingled with song and dance, of the events and fashions and preoccupations of the year—*Revue de fin d'année* was the full designation. Revues later became heterogeneous musical entertainments, largely dependent for success on the personalities of the performers.

Revue des Deux Mondes. Outstanding French periodical which appeared twice monthly from 1829 to the Second Great War. Dealing with politics, history, literature, and art, it was edited by François Buloz, 1831-93; the historian Ferdinand Brune-



Revolver. 1. Colt's original type. 2. Smith and Wesson 8-chamber pattern, with single round enlarged to show blunt lead bullet. 3. Self-extracting safety revolver, open for ejector to throw out spent rounds. 4. Webley-Fosbery automatic service pattern, in which body recoils on frame to revolve chamber

pressing one pin. A revolver of this type is perfectly safe when using the most powerful cartridges. The calibres in most common use in England are .22, .32, and .38, this last being the military weapon.

In recent years the revolver as a pocket weapon has been to a certain extent replaced by the automatic pistol, which is more portable and gives more rapid fire. The lower velocity of the revolver bullet, however, makes it more efficient for stopping an assailant; a misfire is also a matter of less consequence, and a revolver is much more reliable where a weapon is required for heavy use, or where it is liable to become dirty.

If revolvers or pistols are to remain in good order it is essential that they be thoroughly cleaned after use, since modern smokeless nitro powders leave an acid residue which quickly causes rust unless it is cleaned away. The special "nitro-solvents" sold for this purpose are a combination of a mineral oil with alkali which neutralises the residue. *See* Ammunition; Bullet; Cartridge; Firearms; Gun; Gunpowder; Pistol; Rifle.

Revue. Form of theatrical production. Of French origin, it became popular in London from the second decade of the 20th

tière, 1893-1907; and from 1916 by René Doumic, his pupil, like him a member of the Academy. It had Hanotaux and Poincaré among regular contributors, and a moderately nationalist and Conservative trend.

Rewa OR **REWAF.** Largest and chief state of those forming the Vindhya union, India; covering some 13,000 sq. m. in the hilly part of the Bagelkhand. The chief rivers are the Sone and the Tons. The main crops are rice, millet, and wheat, but much of the land is covered with forest. Ruled by Baghel Rajputs, the state was in friendly relations with the British from 1812. Pop. 1,820,445. Its capital, Rewa, is 75 m. S.S.W. of Allahabad. Pop. 31,000.

Rewakantha. Former agency of native states, in Bombay, India. In 1944 all were absorbed by the Gujarat states agency, merged 1947-48 in Bombay state. To the N.E. of Baroda, the territory is crossed by the rly. from Baroda to Ratlam, and by the Mahi river. There are large areas of forest. The inhabitants are Bhils and Kolis.

Reward. Voluntary recompense for voluntary service. In law, where an advertisement is published, offering a reward to anyone who does something, e.g.

gives certain information or restores lost property, anyone who does the act is legally entitled to the reward. In other words, there

Reykjavik. Capital and seaport of Iceland. It stands on the Kollafjord, an opening of the S.W. coast. Among chief buildings are



Reykjavik. General view of the capital of Iceland

is a valid contract. It is a punishable offence to advertise a reward for the return of stolen property, "no questions asked," for this is condoning a crime. The Corrupt Practices Act, 1883, prohibits the offering of a reward to a voter for his vote, and here reward means not only money, but money's worth, e.g. an offer of employment, or gifts in kind.

Rewari. Town of Punjab, India, in Gurgaon dist. It is a rly. junction 32 m. S.W. of Gurgaon. The town is of great antiquity. It reached its present importance as a trading centre in iron, salt, sugar, and wheat under British rule. Fine turbans and brass and pewter vessels are the chief manufactures. Pop. 30,000.

Rexist Party. Former political party in Belgium. Established by Léon Degrelle (q.v.) in 1935 from reactionary members of the Catholic party, it advocated a totalitarian policy, and maintained a close connexion with Hitler and Mussolini. Uncompromisingly anti-Socialist, the Rexists gained 21 seats at the general election in 1936. In March, 1937, Degrelle stood personally in a by-election against the then Belgian premier, van Zeeland, and was decisively beaten; this was a serious setback for the Rexists, and in the election of 1939 only four of their members were elected. When the Germans invaded Belgium in May, 1940, the Belgian govt. outlawed the Rexists and imprisoned Degrelle. The party was revived by the Germans, with whom it collaborated during the occupation, but was again suppressed after the liberation of Belgium in 1944.

the cathedral, governor's house, observatory, library, museum, and hospital. A university was opened in 1911. The building where the parliament of Iceland meets contains a library rich in historical works. Most of the houses are built of wood. In the largest square is a statue of Thorwaldsen. There is steamer connexion with Copenhagen, and fish, butter, and skins are exported. During the Second Great War the town was the headquarters of the Allied occupation forces. Pop. 46,578.

Reymont, WŁADISŁAW STANISŁAW (1867-1925). A Polish novelist, born May 7, 1867. He wrote his first novel when superintendent of a small rly. sector. His best-known work *The Peasants*, appeared in 4 vols. during 1904-09; this epic described the labours of the four seasons, and was remarkable for its observation of bucolic life and character. Other works included *The Promised Land*, 1899; *Before Dawn*, 1902; *The Storm*, 1907. Reymont, who was awarded the Nobel prize for literature in 1924, died Dec. 5, 1925.

Reynard the Fox. Ancient animal legend or beast fable. Apparently of Oriental origin, with the fox as hero by reason of his superior cunning over the other animals, its satirical qualities grew with its European development. It is traceable in Germany to monastic Latin of the 10th century. There was a metrical version, *Reinardus Vulpes*, afterwards called *Isengrimus*, by a Flemish priest, Nivardus of Ghent, in 1148; and in 1180 another, *Isengrene's Not*, or *Reinhart Fuchs*, in Middle High German, by an Alsatian, Heinrich

de Glischezäre. Early in the 13th century a French priest, Pierre de St. Cloud, composed a poem on the subject, which inspired a Flemish poem, *Reinaert*, by J. F. Willems. A prose work, *Die Hystorie van Reynaert de Vos*, by Gerard Leeu, was printed at Gouda, Holland, 1479, from the Low German of which Caxton made a translation in 1481. The earliest printed German edition is one published at Lübeck in 1498. Goethe's *Reinecke Fuchs*, 1794, is a free version in hexameters of the Low German poem. There is an estimate of the comic and satirical qualities of the work in Carlyle's miscellaneous essays. A poem of the chase by John Massfield is entitled *Reynard the Fox*.

Bibliography. *Le Roman de Renart*, E. Martin, 1882-87; *Les Sources du Roman de Renart*, L. Sudre, 1893; *Reynard the Fox*, J. Jacobs, 1895; Caxton's trans., ed. E. Arber, 1895; metrical version, Ellis, 1897.

Reynaud, PAUL (b. 1878). A French statesman. Born Oct. 15, 1878, at Barcelonnette, Basses-Alpes, he entered politics in 1919, when elected deputy for his department. Minister for the colonies, justice, and finance in various cabinets during 1931-38, he was finance minister in the Daladier govt. until March, 1940, when he became premier. Reynaud



Paul Reynaud, French statesman

wanted to transfer the govt. to N. Africa, and when his colleagues did not support him resigned, June 17. In Sept. he was arrested and kept in prison or under house arrest in France until Nov., 1942, when, after the Allied invasion of N. Africa, he was handed over to Germans. Pétain had announced in Feb., 1942, that he would be tried for "misuse of funds," but he was never brought to trial.

Released by the U.S. 7th army from a prison camp at Oranienburg, Tyrol, May 6, 1945, he became a member of the constituent, and then of the national assembly, 1946. He was finance minister in André Marie's cabinet, July 26-Aug. 28, 1948.

Reynolds, GEORGE WILLIAM MACARTHUR (1814-79). British novelist and journalist. Born July 23, 1814, he travelled in France, and translated the works of Hugo and other French romantic writers, publishing (1839)

Modern Literature in France. In 1846 he became editor of the London Journal and founded Reynolds's Miscellany, which continued publication until 1869. During this period he also wrote sensational novels, *e.g.* *Mysteries of London*, 1846-55. Reynolds interested himself in politics from 1840 and became a leader of the Chartists. In 1850 he started Reynolds's Weekly Newspaper, which became the mouthpiece of advanced Radical views. It continued so when it passed under the control of Lord Dalziel, after which, as Reynolds' Illustrated News, it became the official organ of the cooperative movement. The name was changed to Reynolds News in 1936. It originated the heading Hatches, Matches, and Dispatches instead of the normal announcement of births, marriages, and deaths. Reynolds died June 17, 1879.

Reynolds, Sir Joshua (1723-92). British painter. He was born July 16, 1723, at Plympton, Devon.



Self-portrait

J. Reynolds

his father, Samuel Reynolds, being master of the grammar school there. He was at first intended for the medical profession, but showing aptitude for painting, was sent from home in 1740, and placed in the studio of Hudson, the best portrait painter of his day. After a while he returned to Devon, where he painted some twenty portraits, but in 1744 was back again in London, and five years afterwards went in the *Centurion* to the Mediterranean. He visited Lisbon, the Balearic Islands, Leghorn, Florence, and Rome, remaining in the latter place for two years, studying and copying the works

of the Italian masters. He then made a tour through other parts of Italy, and went to Paris. On his return to England he settled in London, in 1760 finally establishing himself in Leicester Square, where he remained until his death, making, however, occasional visits to Devon. From 1752 he suffered from deafness, which he attributed to the cold of the Vatican, where he had spent some time making copies of Raphael.

Reynolds was an exceedingly popular man in the best London society, acquainted with everyone worth knowing. His intimate friend was Johnson, whose death in 1784 was a severe blow to the artist. Others were Burke, Garrick, and Goldsmith, and it was Reynolds who, in 1764, suggested the formation of the Literary Club; in 1765 he became a member also of the Society of Dilettanti. When the Royal Academy was founded in 1768 Reynolds became its first president, and received the honour of knighthood, and for the next 20 years exhibited in its gallery some of his most notable pictures. He founded the R.A. schools, and delivered his first discourse to the students in 1769. The foundation of the R.A. banquet was also due to him, and he suggested the appointment of eminent men of the day to act with the Academy as honorary professors. He resigned his presidency of the R.A. in 1790, but was persuaded by his colleagues to resume the high position. A year afterwards, however, he became blind, and on Feb. 23, 1792, he died. He was buried in the crypt of St. Paul's cathedral.

Reynolds was the great English master of portraiture; an unerring draughtsman, a wonderful colourist gifted with a profound sense of decoration and a graceful humour. His portraits represent the finest of English art in its grandest form. As a writer on art he is chiefly remembered for his Discourses, which contain advice still valuable for students. His best pictures have been the subjects of engravings, nearly 800 contemporary plates having been prepared from his work. Many pictures have suffered from the strange experiments he tried in order to obtain the greatest brilliancy, but it has been wisely said that even a faded picture by Reynolds is greater than the works of any of his contemporaries. Fine examples of his pictures may be seen in the National Gallery, Wallace Collection, National Portrait Gallery, and

Royal Academy, and in many private collections in the U.K. and the U.S.A. Many of the portraits of his contemporaries in this encyclopedia are taken from his works, *e.g.* the duchess of Devonshire, Gibbon, Goldsmith, Dr. Johnson. See Painting.

Bibliography. Works of Sir J. R., E. Malone, 1797; History of the Works of Sir J. R., 4 vols., A. Graves and W. V. Cronin 1899-1901; Lives, J. Northcote, 1819; J. Farrington, 2nd ed. 1819; C. R. Leslie and T. Taylor, 1865; Sir C. Phillips, 1894; Sir W. Armstrong, 1900; Lord R. Gower, 1902; J. F. Molloy, 1906; F. Rutter, 1923; J. Steegman, 1933.

Reynolds, Samuel William (1773-1835). British engraver. Born in London, July 4, 1773, he



S. W. Reynolds,
British engraver
After J. Opie

he studied under C. H. Hodges. At first he painted in oils, and between 1797 and 1827 exhibited portraits and landscapes at the Academy, but his true *métier* was mezzotint engraving, his teacher being J. R. Smith. He engraved more than 300 portraits after Sir Joshua Reynolds, Lawrence, Opie, Northcote, Phillips, Dance, and others; and subject pictures after Morland, Northcote, and contemporary French painters. He was accomplished in etching, stipple, and aquatint, and was fond of combining one or more of these methods with mezzotint in one plate. He died Aug. 13, 1835.

Reynolds, Walter (d. 1327). English prelate. Aided to ecclesiastical preferment by Edward I, he became a favourite of Edward II, who made him bishop of Worcester, 1307, sent him on a mission to Avignon, 1309, and made him lord chancellor in 1310. He attended the council of Vienne, 1311, and in 1314 became archbishop of Canterbury. His private life and political influence were open to the charge that he was a time-server, but he effected several ecclesiastical reforms. Reynolds crowned Edward III in 1327, and died Nov. 16 of that year.

Rhadomancy (Gr. *rhabdos*, rod; *mantela*, divination). Divination by means of a rod or twig, and the discovery of water or ore thereby. See Divining Rod.

Rhadamanthus. In Greek mythology, the son of Zeus and Europa, and brother of Minos, king of Crete. On account of the upright-

ness of his life he was made one of the judges of the dead in Hades, the others being Minos and Aeacus.

Rhaetia or **RAETIA**. Province of the Roman empire lying S. of the Danube and corresponding roughly to the greater part of Tirol with the adjoining Grisons of Switzerland. It was conquered by the Romans under Drusus in 15 B.C., when most of its inhabitants were Celtic. See *Roma*.

Rhaetian Alps. Section of the Central Alpine system. They extend into Italy and Switzerland, and include the Bernina, Albula, and part of the Ortler Alps, and were named from the Roman prov. Rhaetia. The loftiest peak is the Piz Bernina, alt. 13,304 ft., and the chief pass the Splügen, nearly 7,000 ft. in alt. See *Alps*.

Rhaetic Beds. In geology, name given to those rocks found at the top of the Triassic and at the base of the Jurassic. The rocks show the characteristics of both the Triassic and the Jurassic, and were so called from their occurrence in the Rhaetian Alps. They consist of shales, limestone, marls, and sandstones, and contain many fossils, including those of some of the earliest known mammals. They are widely distributed, oc-

curing in Great Britain, Europe, Asia, America, and Australasia.



Rhatany. Foliage, flowers, and seeds; inset, single flower

curing in Great Britain, Europe, Asia, America, and Australasia.

Rhamnaceae or **BUCKTHORN FAMILY**. Large family of trees and shrubs. Natives of warm and temperate regions, they have undivided leaves and small green or yellow flowers. They have purgative properties. Some are used in medicine and in dyeing. See *Buckthorn* (*Rhamnus*).

Rhamnus. Ancient city of Greece, in Attica. It was a port on the N.E. coast, 24 m. N.E. of Athens and 8 m. N.E. of Marathon. It had several temples, notably one of Nemesis, built about 450 B.C.; another was dedicated to

Dionysus. Excavations have revealed remains also of a theatre and a fine statue of Themis.

Rhamporhynchus (Gr. *rhamporos*, crooked beak; *rhynchos*, snout). Extinct flying reptile, one of the Pterodactyls. Little is known about it, the only remains being found in the fine-grained lithographic stone of Bavaria, and those consisting of only part of the wings. See *Pterodactyl*.

Rhampsinitus. Classical name of the Egyptian Rameses III. In this form he is remembered in connexion with the story told of his treasure-house by Herodotus. The architect left a secret way into the treasure-house for his own enrichment, and at his death bequeathed the knowledge to his two sons, who promptly made use of it. Rhampsinitus tried by many stratagems to discover who robbed him, but was always outwitted by the thief. In various forms the story—that of the Master Thief cycle of tales—is found among many different peoples. Pausanias, in his Description of Greece (Bk. ix, 37), gives a similar account of the treasure-house of one Hyrieus.

Rhapsodists. In ancient Greece, professional reciters of the Homeric or other epic poems. The earlier rhapsodists sang to a harp, the later chanted the poems. Such recitations were a great feature of Greek life, and the reciters were held in high esteem. See *Greek Literature*.

Rhapsody (Gr. *rhaptein*, to sew together, compose; *ōdē*, ode). Fragment of an epic poem recited by a minstrel. A rhapsody in the modern sense is a musical composition of the fantasia type, generally founded on some national air, though not necessarily in variation form. Standard examples are by Brahms, Liszt, Rachmaninov, and Gershwin. Generally, the term implies any extravagant utterance or composition.

Rhatany (*Krameria triandra*). Shrub of the family Leguminosae. This native of Peru has alternate, oval, leathery leaves, covered with silvery hairs. The flowers are bright scarlet and irregular in form. The dried root with its red-brown bark is well-known in medicine, affording a form of tannic acid used as a tonic and as an astringent. The infusion is blood-red. *K. argentea*, from Brazil, with purple-brown bark, is used for the same purpose.

Rhayader. Market town of Radnorshire, Wales. It stands on the Wye, with a rly. station 14 m. S. of Llanidloes. It is chiefly an

agricultural centre, having been long famous for its sheep fairs. The town grew up around a castle built about 1180 by the English to defend the district against the attacks of the Welsh. The chief building is S. Clement's church, a Gothic building restored. The scenery around the town is very beautiful. Near are the valleys of the Elan and the Claerwen, with huge reservoirs that supply Birmingham with water. The full Welsh name, Rhayader-ar-Gwy, means falls of the Wye, there having been a waterfall here at one time. Pop. 900.

Rhea. In Greek mythology, daughter of Uranus, Heaven, and Ge, the Earth. She was the wife of Cronos (q.v.), by whom she was the mother of Zeus, Demeter, Hera, Poseidon, and Pluto. Rhea, originally a Cretan divinity, became early identified with the Phrygian goddess of nature and fertility, Cybele, whose worship at Pessinus was conducted with clashing cymbals and extravagant Oriental rites. In art, Rhea is represented as wearing a mural crown, and with lions either sitting by her throne or drawing her chariot. See *Atys*; *Corybantes*.

Rhea or **AMERICAN OSTRICH**. Genus of running birds. They occur only in S. America and resemble small ostriches except that the head and neck are feathered, the feet have three toes instead of two, and the tail is rudimentary. Three species are usually recognized, the common rhea, Darwin's rhea, and the long-billed rhea. The general colour of the plumage of all



Rhea. South American running bird allied to the ostrich
Gambier Bolton F.Z.S.

three is grey, but it differs in tone, and the species vary in size, the common rhea being the largest. The birds are found in small companies on the plains, several hens consorting with a cock and laying in a common nest. As with the ostrich, the cock bird undertakes the task of incubation. The birds run fast, and their colour makes it difficult to see them at even a short distance. They are hunted by horsemen armed with the bolas, a cord with a stone or weight at each end. Their feathers are used for feather dusters.

Rhea Silvia. In Roman legend the mother of Romulus and Remus, their father being the god Mars. Being a vestal virgin vowed to perpetual chastity, she was thrown into the Tiber by her uncle Amulius, but, according to one tradition, she was saved by, and became the wife of, the river-god. How her sons avenged the treatment of their mother is told under the entry Romulus. She is identified with the Greek Rhea, whose epithet *Idaea*, like the Latin *Silvia*, means "of the forests."

Rheims. Anglicised name of the French city, Reims (*q.v.*).

Rheine. Town in N. Rhine Westphalia, Germany, on the Ems, 29 m. W. of Osnabrück. It is a rly. junction and industrial centre. In the Middle Ages it was the capital of a small principality, and later became the property of the bishops of Münster. It has a Gothic church (1484), a castle (1437), and a bridge built in 1690. Its salt production dates back to the 11th century; modern industries are cotton spinning and weaving, engineering, and tobacco preparation. During the Second Great War Rheine and the surrounding network of airfields, fired by the Germans before they abandoned them, were captured April 2, 1945, by British forces. After Germany's unconditional surrender Rheine came within the British zone of occupation. Pop. 33,600.

Rheingau. District in the former province of Hesse-Nassau, Germany. Its area was slightly over 100 sq. m. The name was originally applied to an area parallel with the Rhine, beginning 4 m. W. of Mainz and stretching along the right bank for about 15 m., with a depth of 4-5 m., fenced off and enjoying sunny rights. The soil and a warm climate produce the finest Rhine wines. From the early Middle Ages it belonged to the archbishop-electors of Mainz, but fell to Nassau in 1803 and to Prussia

in 1815. It has one of the most beautiful landscapes of Germany and possesses many old castles. The chief town is Eltville.

Rheingold, Das. Opera by Wagner, the first of the four operas making up *Der Ring des Nibelungen*. Wagner stated that the music came to him during a sleepless night at an inn, and it was written down in 1853-54. The opera was first produced at Munich, Sept. 22, 1869, and in London at Her Majesty's Theatre, May 5, 1882. The first performance in English was given at Covent Garden, under Richter, in 1908.

Rhenium. Metallic element, symbol Re, at. no. 75; at. wt. 186.31; density 21.4 gm. per c.c.; melting point 3,167° C. It is a rare metal, first discovered in 1925, with properties intermediate between tungsten and osmium. Re 187 and Re 185 are the stable isotopes with relative abundances of 61.8 and 38.2 p.c. respectively.

Rheology. Science of the deformation and flow of matter. It thus includes elastic, plastic, or viscous types of deformation. The subject is of wide interest to chemists, engineers, and physicists. It is of considerable importance to all types of industry employing synthetic materials. In particular may be mentioned the rubber, plastic, textile, pottery, and foodstuffs industries.

Rheostat (Gr. *rhein*, to flow; *statos*, fixed). In electricity, an adjustable resistance to control the flow of electric current through a circuit. It is the electrical counterpart of a steam or water valve. A rheostat can assume various forms. A variable number of wire resistances may be connected in series, the number being varied by a contacting arm moving over a number of brass studs between which the resistances are soldered. Alternatively, the contact pressure between a number of carbon plates connected in series may be adjusted to vary the electrical resistance. Liquid resistances, acid or alkaline solutions, are also used.

The starting switches of railway, lift, and other motors are generally provided with a time control, which renders it impossible for the

full current to be admitted suddenly and burn out the windings. See Electricity.

Rhesus or BENGAL MONKEY (*Macacus rhesus*). Small long-tailed monkey of the family *Cercopithecidae*, common throughout the N. of the Indian sub-continent. It is usually nearly 2 ft. long in body, with a tail varying from 6 to 8 ins. Its fur is brown, with a greyish or greenish tinge, and the bare parts of the face are red in old specimens. Around Simla it occurs at considerable elevations among the mountains. It



Rhesus or Bengal monkey, an animal common in N. India
W. S. Berridge, F.Z.S.

is regarded as a semi-sacred animal by many Hindus, and may be found in the precincts of temples. It feeds mainly on fruit and seeds, but will also eat insects. In captivity it displays great intelligence, and is in favour as a pet. For its use as a subject of medical experimentation, see Rh Factor.

Rhetoric (Gr. *rhetorikē*). Originally the art of speaking effectively in public, and later extended to include the effective presentation of words either in oratory or writing. It has been defined as "that art or talent by which the discourse is adapted to its end."

The earliest treatise on rhetoric is that of Aristotle (4th century B.C.), in which it is regarded as a branch of logic, and as the means of establishing the superiority of truth over falsehood. Earlier rhetoricians had claimed that the end of rhetoric was to convince, whether rightly or wrongly; but the Aristotelian view came to be generally accepted. The three chief elements of rhetoric as applied to oratory were regarded as invention, arrangement, and elocution, though some writers included memory and utterance, both of which might be supposed to be included in the three named. There have been many modern works on rhetoric, such as Wilson's *Art of Rhetoric*, 1553, new ed. 1909; Campbell's *Philosophy of Rhetoric*, 1776; Blair's *Rhetoric and Belles Lettres*, 1817; Whately's *Elements of Rhetoric*, 1828; Cope's *Introduction to the Study of Aristotle's Rhetoric*, 1867; and Aristotle's *Rhetoric*, Eng. trans. Jebb and Sandys, 1909. See Oratory.

AIDE-de-CAMP'S LIBRARY

Accn. No.... 36.....

1. Books may be retained for a period not exceeding fifteen days.